

# An Analytical Study of Buyers' Behaviour Towards Automatic Fuel Pricing and Price Smoothing in India

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## Abstract

India is the third-largest country in fuel consumption and followed the Administered Pricing Policy for fixing the retail fuel prices. In June 2017, India moved to Automatic Fuel Pricing on a full scale, which enabled automatic, everyday adjustment of retail petrol and diesel prices in line with global prices. In an automatic or dynamic fuel pricing mechanism, the retail price is revised daily in response to changes in global prices. Automatic fuel pricing made the fixation of prices more transparent and logical. Since the fuel pricing plays a vital role in economic transactions and involvement of public consumption, the need for further penetration into this arena exists, and thus, this study was carried out. Smoothing techniques in statistics are used to cancel or reduce the effects of random variations in data, which is collected over a period of time. The current study investigated the impact of price smoothing on buyers' behaviour and tried to find out the impact of automatic fuel pricing on buyers' behaviour through the data collected from 124 respondents across the country using a standardized questionnaire. Statistical analysis tools such as cross tabulation, pie-charts, histogram, regression, and ANOVA were employed to analyze the data and test the hypotheses. The major results indicated that buyers were positive towards daily revision of prices and believed that daily price revision brought transparency in fuel price fixation and reduced fuel price speculation. In response to the pre-payment scheme, facts revealed that buyers were inclined towards the pre-payment scheme, and they would opt for this scheme if made available in the market and were ready to deposit a specified amount with a vendor. Mixed responses were obtained from the buyers when they were asked to opt for the scheme with some terms and conditions.

**Keywords :** automatic fuel pricing, price smoothing, buyers' behaviour, pre-payment scheme

**JEL Classification :** E31, M30, M31

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The level of retail petroleum prices is an important economic variable in developing countries as mentioned by Federico et al. (2001). India is the third-largest country in fuel consumption followed by the U.S. and China and consumes 83.5 million tonnes of diesel, while petrol consumption was 28.3 million tonnes in the year 2018–19 as reported by Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India (2019). There was a dramatic increase and decrease of the international crude oil prices and this change was always bringing a roller coaster experience to the Indian government and buyers. Dani (2014) mentioned that fuel is one of the basic community needs. Even a small increase in international oil prices can have a significant impact on the economy and consumers as observed by McCulloch et al. (2017).

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A study by Bhattacharya and Batra (2009) found that any change in the price of crude oil impacted on the price of fuel and this reflected that the energy bill of the economic agents (households, industry, and government) grows at the consumer standpoint. Post World War II, the U.S. monetary authorities attempted to eliminate the seasonal fluctuations in prices and nominal interest rates (Canova, 1992). In India, the Administered Pricing Policy was followed for many years on fixing up the retail fuel prices. However, this continued despite the fluctuations in global oil prices and rising demands of a developing aspirational economy. The policy intent was to insulate the domestic economy from price volatility in the international market on one hand, and inflationary control on the other. It was believed that an administered price policy protected the economy from such price shocks, whereby the impact was largely absorbed by the oil marketing companies and consumers did not bear the consequences. Evidently, the oil marketing companies, because they were unable to pass through the cost increases to the retail selling prices, incurred an under-recovery on their sales.

A study done by Shome et al. (2018) found that India's demand will more than double to 8.2 million bbl/d by 2040, while domestic production will remain relatively flat, hovering around 1 million bbl/d. Dani (2014) mentioned that the prices of fuel change daily, which is coined as dynamic fuel pricing. This everyday change in fuel prices is based on the international market price of crude oil and foreign exchange rate.

## **Literature Review**

In an automatic mechanism, the retail price which consumers pay for fuel is revised daily in response to changes in global prices. Many developing countries and emerging economies in the world have a system of administered pricing for fuel in the domestic economy. This means that changes in the global prices are not fully passed through to the consumer as and when they occur. This exposed the respective economies to financial risks when the global market prices are volatile. Over longer periods, this further translated into a financial burden which the governments often found difficult to manage policy-wise. Adoption of an automatic mechanism for fuel price adjustment intended to support governments in managing fiscal costs and risks in this regard.

A research study by Coady et al. (2012) on automatic fuel pricing underlined the following objectives :

- ↳ Pass through global price changes to domestic retail prices.
- ↳ Arrest instability in fuel tax revenues.
- ↳ Remove ad hoc approach to fuel price fixation, making the system more transparent.
- ↳ Reduce government interference in the market mechanism.

### ***The Case of India***

On June 16, 2017, a new scheme was implemented under which prices were to be revised every morning at 6 am (IST). Before this development, fuel prices in India were reviewed every first and 16th day of the month based on the global prices and the exchange rate of the currency and subsequently revised (Madhukalya, 2018).

The underlying reasons for this change are summarized as follows :

- ↳ Daily revision of prices tend to reflect small, marginal changes, unlike changes once in 15 days, which may mandate bigger adjustments or accommodate larger changes. Greater rise in prices accompanied with relatively inelastic demand of the product places pressure on consumer budget.
- ↳ To move towards a market economy, where market dynamics are guided by actions of buyers and sellers, there

must be systematic attempts to align both buyers and sellers to the market, while government interferes to regulate and stabilize. Besides, when market rules, the benefits of fall in prices are transferred to the consumers.

- ↳ Fuel subsidies attempt to keep the domestic prices lower than global prices, which tend to attract more consumption of fossil fuel and may largely discourage the development of renewable substitutes. Policy wisdom should ideally do the opposite towards sustainability goals.
- ↳ Automatic fuel pricing made the fixation of prices more transparent and logical. Consumers are aware of the underlying reasons behind market price movements, and as such creates greater trust in the market mechanism.
- ↳ Automatic fixation of fuel prices also dissociated politics with price fixation and disabled its use as a tool to garner political mileage.

Goyal and Shiva (2016), in their empirical research, supported a high degree of cost-consciousness of the Indian consumer with regard to both running of vehicles and their maintenance. We have drawn useful insights on the value placed on the cost element in consumer decision making. Tara et al. (2015) pointed out that the green marketing philosophy is gaining support from the masses, and this attitude of the consumers was motivating the adoption of innovative and environmentally sustainable ways. We gauged from the study the importance of sustainability as central to any policy related to non-renewable fuels. Khandelwal et al. (2016) in their research work indicated that eco-friendly cars or hybrid cars are yet to find complete acceptance with Indian consumers. This is indicative of a continued preference for non-renewable fuel-based vehicles, further implying towards a high demand for petrol and diesel. A sustained high demand may act as a motivation for the implementation of automatic fuel pricing.

## Price Smoothing

Smoothing techniques in statistics are used to cancel or reduce the effects of random variations in data which are collected over a period of time. Application of these techniques tends to smoothen out any random variations in the time series data set, which helps in establishing trends. Based on these observations, predictions can be made about the future. Amihud and Mendelson (1983) observed that the nature of price smoothing depends on the nature of economic shocks, on the inventory holding cost, and on the cost of backlogging.

Price smoothing includes the following mechanisms. Those are :

- ↳ **Price Band Mechanism :** This mechanism establishes a perimeter to the magnitude of price changes at the retail level by defining the maximum limit or caps.
- ↳ **Moving Average Mechanism :** This mechanism centers retail price alterations on variations in the average of import costs in the past.

## International Scenario

### *Bangladesh*

According to Ahmed et al. (2016), fuel pricing reforms were initiated in Bangladesh during 2003–04, with the establishment of Bangladesh Energy Regulatory Commission (BERC) which facilitated the pass-through of global prices by setting up an automatic price mechanism. Finding roadblocks in terms of adverse impact on

consumer budgets and anticipation of public resistance, the automatic fuel pricing policy did not kick start. In 2012, a 3 - year Extended Credit Facility Arrangement with the International Monetary Fund rehabilitated efforts towards automatic fuel price mechanism. A structural standard for the automatic price was devised. However, it was never implemented. The policy flip-flop and reluctant efforts towards realization were rationalized on three grounds – enable affordable oil to the poor, support to farmers through subsidized fuel for mechanized irrigation, and the dread of triggering cost-push inflationary pressures.

### ***China***

In May 2009, the government implemented a pricing mechanism which adjusted domestic prices in line with international prices. Under this mechanism, domestic prices were attuned when the moving average of global crude oil prices was increased by greater than 4%. This occurred within 22 consecutive days. Further progress was made in deregulating and global market orientation of fuel pricing in 2013 by the National Development Reform Commission (NDRC) of China. The reforms at this stage included the reduction of the adjustment period from 21 days to 10 days and the removal of the threshold limit of 4%. Confronted with a substantial decline in world crude prices around 2014 and the consequent challenges posed by high costs of domestic production, a policy reform was introduced. This stated that domestic price adjustments would not be made if the global crude oil prices declined lower than US\$40 per barrel. Currently, the government adjusts the domestic retail fuel prices to reflect international crude oil prices within a price band of US\$40 to US\$130 a barrel (O'Sullivan, 2018). The establishment of the Shanghai Petroleum and Natural Gas Exchange in November 2016 and the Chongqing Petroleum and Natural Gas Exchange in January 2017 were key infrastructure enablers facilitating long-term market pricing in China (Deloitte, 2017).

### ***Brazil***

Fattouh et al. (2015) mentioned that Brazil's petroleum products' liberalization journey began in the 1990s and the process, which was carried out in a phased manner, was completed in 2002 when no longer any official government involvement in price fixation remained. The underlying objectives of the liberalization process included :

- ↳ Invigorate economic efficiency in the sector by enthusing competition.
- ↳ Provide ingenuous price signals to the consumers.
- ↳ Promote conservation and usage efficiency.
- ↳ Support revenue generation for the government.

However, escalation in global oil prices in 2007–08 fuelled concerns of inflationary pressures, shoring up the case for price controls. Moreover, Brazilian government's controlling stake in Petróleo Brasileiro S.A (Petrobras) prioritized macroeconomic and social objectives over the company's financial prudence and business growth objectives. Besides, tax levels were adapted during oil price rise to stabilize retail price and minimize the impact on the final consumer. These aspects proved to be bottlenecks for ensuring parity between domestic and international prices as studied by De Oliveira and Laan (2010).

### ***Indonesia***

The period after the 2014 elections in Indonesia witnessed President Joko Widodo's assertive signalling of fuel

pricing reforms. This was followed by the policy intent of increasing fuel prices across product categories. February 2015 onwards, the strategy of a monthly revision of prices was announced (Setyawan, 2014).

Nearly two decades of a journey towards linking domestic fuel pricing with international prices exhibited a lack of commitment. Intermittent price increases, mainly in 2005, 2008, and 2013 reduced the divergence between domestic regulated prices and market prices. However, as global prices recovered, subsidization matched. Widodo's post-2014 elections promise of raising fuel prices by about 30%, in an attempt to trim down its \$23 billion fuel subsidy bill by \$8 billion, remained unfulfilled. Inflation concerns dominated the policy decisions and subsidization continued to be seen as a tool for addressing poverty. The Indonesian treasury continues to be burdened with subsidies and domestic fuel price linkages with global prices remains work in progress (G20 2019 Japan, 2019).

### ***Mexico***

The 2013 energy reform bill ushered in wide-ranging policy changes which opened the sector to private players as well as changed the pricing policy. In 2015 and 2016, the SHCP set a national maximum price monthly as observed by Plante and Jordan (2013).

From April 1, 2016, as a part of the economic deregulation process, private companies were allowed imports, transportation, storage, distribution, and selling rights for petroleum products. Liberalization of fuel prices was also facilitated by November 30, 2017. A liberalized business environment, however, continues to witness a price stabilization strategy. Government levies an excise tax on fuel sold by public and private companies. The tax level is used as a smoothing mechanism and is altered weekly to absorb changes in international prices as stated by Davis et al. (2019). Jayaraman et al. (2016) also indicated that people have become conscious of environmental problems and the eventual benefits of the public transport system.

## **Fuel Tax Revenue and the Indian Consumer**

Taxes on fuel in India are, perhaps, one of the highest in the world. The crude oil price for Indian basket was \$105.56/bbl in April 2014–15 and \$69.22/bbl in April 2018–19. For the same time, the amount contributed to the central exchequer through petroleum products increased from ₹ 1,72,065.39 crore to ₹ 3,48,041.06 crore and contribution to state exchequer increased from ₹ 160554.29 crore to ₹ 227590.78 crore. This means, while crude oil price per barrel for Indian basket fell by 34% in 5 years, contribution to central exchequer increased by 102% and state exchequer by 42%. During April 2014–2018, retail petrol price in Delhi fell from ₹ 72.26 to ₹ 66.29 per litre, showing a decline of 8%, while diesel prices showed a marginal change from ₹ 55.49 to ₹ 55.61 per litre. Global linkages of domestic fuel prices entail that consumers should have benefited by way of a full pass-through. However, figures indicate that fuel continues to be an important source of revenue for the Government in India (Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India, 2019).

## **Research Gap**

The review of literature shows various aspects of fuel pricing in various countries such as Bangladesh, China, Brazil, Indonesia, Mexico, and even portrays the Indian economy. Even though the review pointed out the major happenings and academic research evidences on automatic fuel pricing and price smoothing, the density of contributions to the Indian context have been found to be limited. This conceives a research gap for this study. Also, on the areal view of the Indian context, though the Government has competitive policies on fuel pricing, the effectiveness of such implications is quite invisible. This is evident as a consistent decline in international crude oil prices saw a marginal or no pass-through to domestic prices. Consumer perspectives in such a situation, at best,

can only be assessed unidirectionally, as any impact of global prices gets overshadowed by fuel tax apprehensions. To fill these voids, this study has been specifically built around the Indian context and examines Indian consumer behaviour towards automatic fuel pricing and price smoothing.

## **Objectives of the Study**

- (1)** To study the implementation of automatic fuel pricing mechanism in India.
- (2)** To conduct a comparative analysis of fuel prices in India with select countries.
- (3)** To analyze buyers' perception towards full pass-through of changes in international fuel prices to domestic fuel prices.
- (4)** To explore buyers' perspectives on the possibilities of domestic fuel price smoothing.

## **Research Methodology**

### ***Research Design***

This research study concentrates on two predominant aspects such as automotive fuel pricing and price smoothing and consumer behavior towards it. Hence, the type of research employed here is descriptive and empirical in nature.

### ***Sample Size and Data Collection***

The sample size of this study was 124 and was selected on the basis of two-stage convenient sampling as selection was based on the respondents' knowledge of fuel price and price smoothing across the nation. The data were collected through a structured questionnaire containing 10 questions including several sub-questions. The data were gathered through personal interactions with the respondents and invitations sent by emails.

### ***Time Period***

In India, automatic fuel pricing was implemented on June 16, 2017. However, this study was carried out to study buyer behaviour during January – October 2019. This was to capture the actual impact in entirety and not as a typical reaction to government policy change. As an immediate aftermath of the policy implementation, responses of ordinary consumers run the risk of influence from noise in the environment. The intention was to enable an adequate time period to effectively gauge behavioural responses, ensuring sifting of the noise impact from the actual impact.

### ***Data Analysis***

To analyze the primary data and test the hypotheses, statistical tools such as cross tabulation, pie-charts, histogram, regression, and ANOVA are used. Simple percentage analysis has been used for understanding the distribution of the respondents towards various study factors. Pie-charts and histograms are used to represent the responses of respondents to the research questions graphically. Regression analysis is used to predict the dependent variable (Advanced payment for fuel at a guaranteed capped price) from number of various independent variables used in this study. ANOVA is used to find out the significant impact of each independent variables on the dependent variable, level of variation in the dependent variable, and testing the hypotheses.

## Data Analysis and Results

### *Fuel Prices in India and Comparison with Selected Countries*

Table 1 exhibits the Indian crude basket between 2000–01 to 2018–19. The price figures are an average of the daily prices prevailing in the respective months presented in Table 1.

**Table 1. Prices of the Indian Crude Oil Basket (\$/bbl)**

| Year           | Apr.   | May    | June   | July   | Aug.   | Sep.   | Oct.   | Nov.   | Dec.   | Jan.   | Feb.   | Mar.   | Avg.          |
|----------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------------|
| <b>2000–01</b> | 22.51  | 26.60  | 28.49  | 27.26  | 28.33  | 31.34  | 30.50  | 30.93  | 23.25  | 24.02  | 25.92  | 23.82  | <b>26.92</b>  |
| <b>2001–02</b> | 24.82  | 26.95  | 26.63  | 23.99  | 25.01  | 24.79  | 20.05  | 18.24  | 18.24  | 18.92  | 19.53  | 23.31  | <b>22.55</b>  |
| <b>2002–03</b> | 25.03  | 24.99  | 24.05  | 25.18  | 25.86  | 27.50  | 26.90  | 23.68  | 27.11  | 29.59  | 31.31  | 28.83  | <b>26.60</b>  |
| <b>2003–04</b> | 24.21  | 24.99  | 26.43  | 27.46  | 28.66  | 26.27  | 28.45  | 28.23  | 28.97  | 30.00  | 29.65  | 32.21  | <b>27.98</b>  |
| <b>2004–05</b> | 32.37  | 36.08  | 34.16  | 36.35  | 40.52  | 39.15  | 43.38  | 38.90  | 36.82  | 40.96  | 42.67  | 49.27  | <b>39.21</b>  |
| <b>2005–06</b> | 49.43  | 47.00  | 52.72  | 55.01  | 60.05  | 59.74  | 56.28  | 53.14  | 55.05  | 60.54  | 58.95  | 60.01  | <b>55.72</b>  |
| <b>2006–07</b> | 67.06  | 67.22  | 66.90  | 71.29  | 70.78  | 60.93  | 57.27  | 57.79  | 60.34  | 52.53  | 56.53  | 60.26  | <b>62.46</b>  |
| <b>2007–08</b> | 65.48  | 65.70  | 68.10  | 72.58  | 68.98  | 74.78  | 79.33  | 89.11  | 87.92  | 89.52  | 92.37  | 99.76  | <b>79.25</b>  |
| <b>2008–09</b> | 105.72 | 120.91 | 129.72 | 132.47 | 113.05 | 96.81  | 69.12  | 50.91  | 40.61  | 43.99  | 43.22  | 46.02  | <b>83.57</b>  |
| <b>2009–10</b> | 50.14  | 58.00  | 69.12  | 64.82  | 71.98  | 67.70  | 73.06  | 77.39  | 75.02  | 76.61  | 73.69  | 78.02  | <b>69.76</b>  |
| <b>2010–11</b> | 84.08  | 76.16  | 74.33  | 73.54  | 75.13  | 76.09  | 81.11  | 84.26  | 89.77  | 93.87  | 101.62 | 110.71 | <b>85.09</b>  |
| <b>2011–12</b> | 118.64 | 110.80 | 109.99 | 112.53 | 106.94 | 108.79 | 106.11 | 109.62 | 107.19 | 110.47 | 117.67 | 123.61 | <b>111.89</b> |
| <b>2012–13</b> | 117.97 | 108.05 | 94.51  | 100.34 | 110.07 | 111.77 | 109.79 | 107.87 | 107.28 | 109.55 | 112.68 | 106.45 | <b>107.97</b> |
| <b>2013–14</b> | 101.57 | 101.10 | 101.11 | 104.86 | 108.45 | 109.47 | 107.37 | 106.55 | 108.72 | 105.29 | 106.19 | 105.30 | <b>105.52</b> |
| <b>2014–15</b> | 105.56 | 106.85 | 109.05 | 106.30 | 101.89 | 96.96  | 86.83  | 77.58  | 61.21  | 46.59  | 56.43  | 55.18  | <b>84.16</b>  |
| <b>2015–16</b> | 59.07  | 63.82  | 61.75  | 56.30  | 47.33  | 46.10  | 46.68  | 42.50  | 35.68  | 28.08  | 30.53  | 36.42  | <b>46.17</b>  |
| <b>2016–17</b> | 39.88  | 45.01  | 46.96  | 43.52  | 44.38  | 44.48  | 49.25  | 44.46  | 52.74  | 54.08  | 54.86  | 51.47  | <b>47.56</b>  |
| <b>2017–18</b> | 52.49  | 50.57  | 46.56  | 47.86  | 50.63  | 54.52  | 56.06  | 61.32  | 62.29  | 67.06  | 63.54  | 63.80  | <b>56.43</b>  |
| <b>2018–19</b> | 69.22  | 75.25  | 73.83  | 73.47  | 72.53  | 77.88  | 80.08  | 65.40  | 57.77  | 59.27  | 64.53  | 66.74  | <b>69.88</b>  |

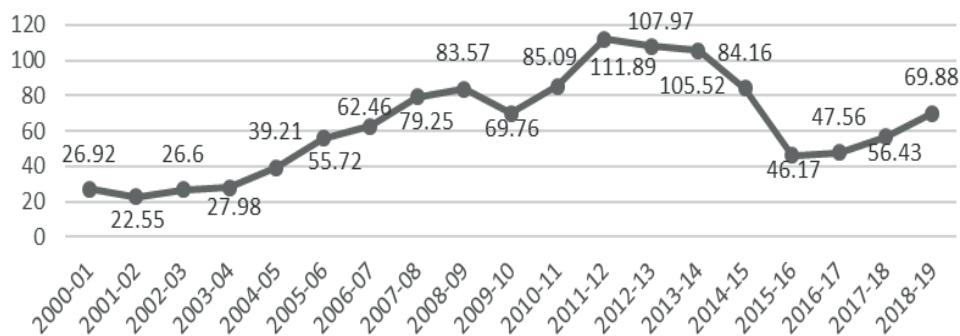
Source : Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India (2019).

It can be inferred from Table 1 that there was a fluctuation in the average values between 2000 – 2019. With gradual increasing and decreasing values, there was a highest average value of 111.89 between the year 2011 and 2012. This shows that the year 2011– 2012 had the highest price of Indian crude oil. To detail this further, the average prices over nearly two decades show significant fluctuations, which are presented in Figure 1. It is this consistent variation, which requires to be passed through to the consumer for the benefit of both the oil companies and the consumers. When global prices are falling, the benefit should be passed on to the consumer, and when they are rising, the oil companies should be insulated from losses with an effective market mechanism.

From Figure 1, it is inferred that the years such as 2011–12, 2012–13, and 2013–14 witnessed high average values of Indian crude oil prices such as 111.89, 107.97, and 105.52, respectively.

The retail price of petrol and diesel is built upon the import cost by factoring in freight, taxes, and commission component to the base price. Table 2 depicts the retail price calculation. This varies across states in India on account of differential taxes. Price build-up of petrol and diesel has been calculated for New Delhi in Table 2. As

**Figure 1. Prices of the Indian Crude Oil Basket (\$/bbl)**



Source : Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India (2019).

**Table 2. Retail Price Calculation**

| Price build-up (in Delhi)                       |       | Effective June 1, 2019 |        |
|---|-------|------------------------|--------|
| Element   | Unit  | Petrol                 | Diesel |
| Base price                                      | ₹/Ltr | 34.55                  | 39.98  |
| Freight etc.                                    | ₹/Ltr | 0.31                   | 0.28   |
| Add: Excise duty                                | ₹/Ltr | 17.98                  | 13.83  |
| Add: Dealers' commission (average)              | ₹/Ltr | 3.55                   | 2.50   |
| Add: VAT (including VAT on dealers' commission) | ₹/Ltr | 15.23                  | 9.77   |
| Retail selling price                            | ₹/Ltr | 71.62                  | 66.36  |

Source : Indian Oil Corporation Limited.

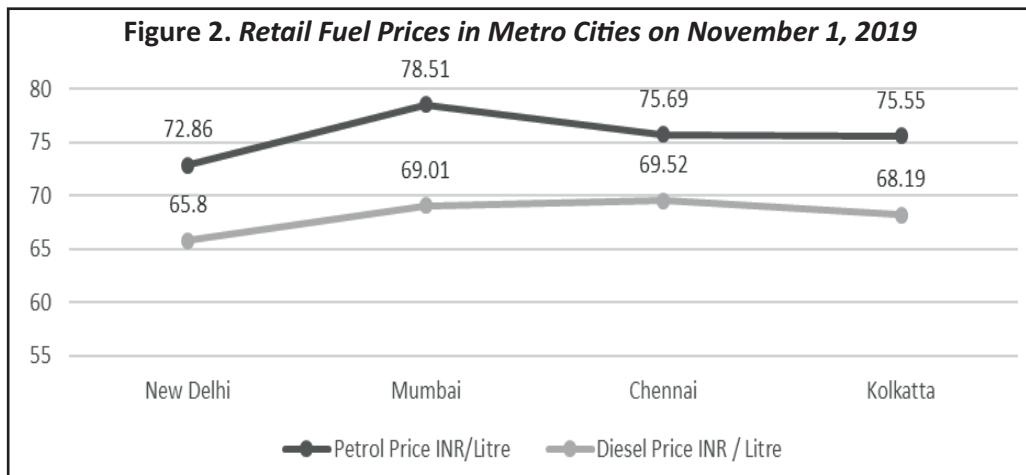
on June 1, 2019, with a base price of ₹ 34.55 per litre, the retail price of petrol on the day worked out to be ₹ 71.62. For diesel, the base price of ₹ 39.98, after incorporating all costs, works out to be ₹ 66.36 per litre.

Table 3 shows the comparative analysis of retail petrol and diesel prices across the metros such as New Delhi, Mumbai, Chennai, and Kolkata as on November 1, 2019. From Table 3, it can be inferred that the highest price of petrol was in Mumbai (₹ 78.51 per litre) and the lowest price was in New Delhi (₹ 72.86 per litre). For diesel, the lowest price of ₹ 65.8 per litre was seen in New Delhi ; whereas, the other metros were more or less at par with marginal differences such as Mumbai – ₹ 69.01, Chennai – ₹ 69.52, and Kolkata – ₹ 68.19.

**Table 3. Comparative Analysis of Retail Petrol and Diesel Prices across the Four Metro Cities**

| Metro     | Petrol Price / Litre* | Diesel Price / Litre* |
|-----------|-----------------------|-----------------------|
| New Delhi | ₹ 72.86               | ₹ 65.8                |
| Mumbai    | ₹ 78.51               | ₹ 69.01               |
| Chennai   | ₹ 75.69               | ₹ 69.52               |
| Kolkata   | ₹ 75.55               | ₹ 68.19               |

**Note.** \*Prices as on November 1, 2019.



A graphical presentation of Table 3 has been depicted in Figure 2. Figure 2 shows that the prices across India were not uniform. It also opens the debate on one India, one market. Also, the figure represents that Mumbai had higher petrol price of ₹ 78.51 per litre and Chennai had higher diesel price of ₹ 69.52 per litre on November 1, 2019.

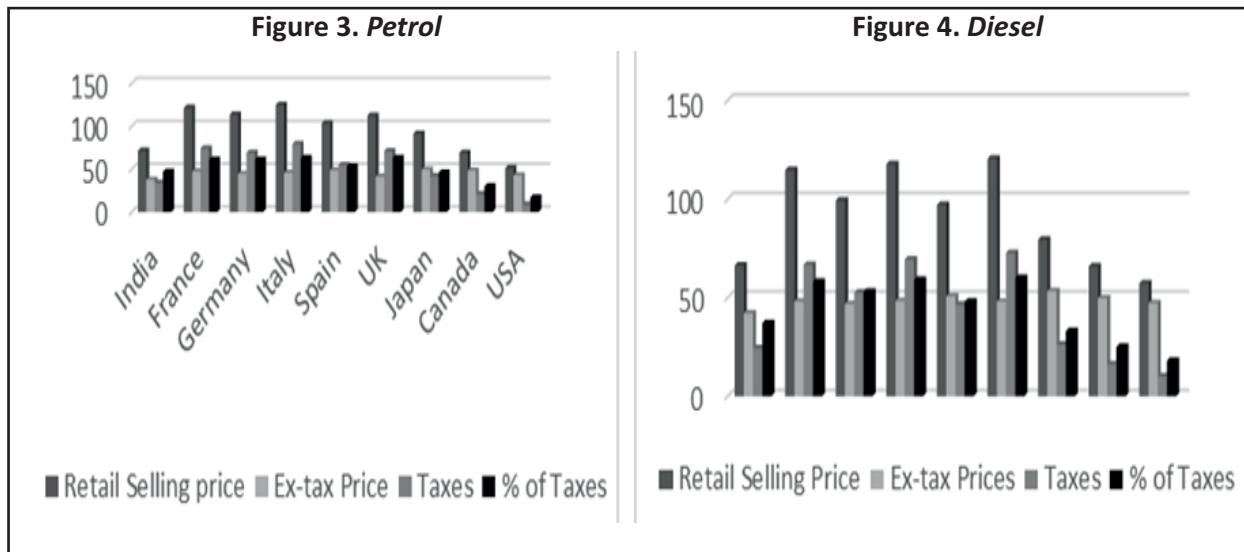
Table 4 shows the petrol and diesel prices of countries such as India, France, Germany, Italy, Spain, UK, Japan, Canada, and USA. Table 4 compares the retail prices of petrol and diesel prevailing in India with that of several developed countries. It is only necessary to draw international comparisons for a commodity which occupies maximum space and volume in our international trade statistics and policy. Table 4 also shows that the percentage of tax component in India was 47% on petrol and 37% on diesel. A graphical presentation of Table 4 has been done separately for petrol and diesel and presented in Figure 3 and Figure 4.

Figure 3 and Figure 4 show the petrol and diesel prices, respectively. It can be observed that the retail petrol price in Italy was higher than that of other countries. Similarly, UK had higher retail price of diesel. Retail prices of petrol and diesel in India seem to be lower than the prices in most advanced countries. However, it is important

**Table 4. Retail Selling Price and Percentage of Taxes in Retail Selling Price of Petrol and Diesel in Developed Countries vis-à-vis India (Price and Tax in INR/Litre)**

| Country | Petrol               |              |       |            |                      | Diesel        |       |            |  |
|---------|----------------------|--------------|-------|------------|----------------------|---------------|-------|------------|--|
|         | Retail Selling price | Ex-tax Price | Taxes | % of Taxes | Retail Selling Price | Ex-tax Prices | Taxes | % of Taxes |  |
| India   | 71.62                | 37.75        | 33.87 | 47         | 66.36                | 42.01         | 24.35 | 37         |  |
| France  | 121.62               | 47.43        | 74.19 | 61         | 114.68               | 48.05         | 66.62 | 58         |  |
| Germany | 113.74               | 44.47        | 69.27 | 61         | 99.23                | 46.73         | 52.5  | 53         |  |
| Italy   | 125.05               | 45.71        | 79.34 | 63         | 117.64               | 48.29         | 69.35 | 59         |  |
| Spain   | 103.52               | 48.68        | 54.84 | 53         | 97.05                | 50.63         | 46.42 | 48         |  |
| UK      | 112.47               | 41.26        | 71.21 | 63         | 120.52               | 47.95         | 72.56 | 60         |  |
| Japan   | 91.43                | 49.45        | 41.98 | 46         | 79.43                | 53.3          | 26.12 | 33         |  |
| Canada  | 69.23                | 48.42        | 20.81 | 30         | 65.86                | 49.67         | 16.19 | 25         |  |
| USA     | 51.31                | 42.7         | 8.61  | 17         | 57.21                | 47.14         | 10.07 | 18         |  |

Source : Petroleum Planning & Analysis Cell, Ministry of Petroleum & Natural Gas, Government of India (2019).



to note that the comparisons have been drawn with the exceptions of Canada and USA and represented in Table 5. This is reflective of the typical government policy towards the commodity, intending to keep the general price level low, keeping in mind low per capita disposable incomes and the general nature of a developing economy.

Figure 5 depicts the percentage of tax components in retail diesel and petrol prices among various countries. From Figure 5, it can be inferred that the highest percentage of tax component (63%) in retail price for petrol was in UK and Italy. For diesel, it is observed that UK had 63% tax component in retail diesel price. In India, the tax component in retail petrol price was 47% and retail diesel price was 37% (the detailed analysis has been shown in Table 3 and Figure 2). This is lower than what it is in most advanced countries except Canada and USA, where the tax component was found to be lower. Significantly, the lowest tax component of USA was 8.61% for petrol and 18% for diesel. It is interesting to note that it is only in USA and Canada that the tax component in retail prices for petrol is less than that of diesel, unlike any other country.

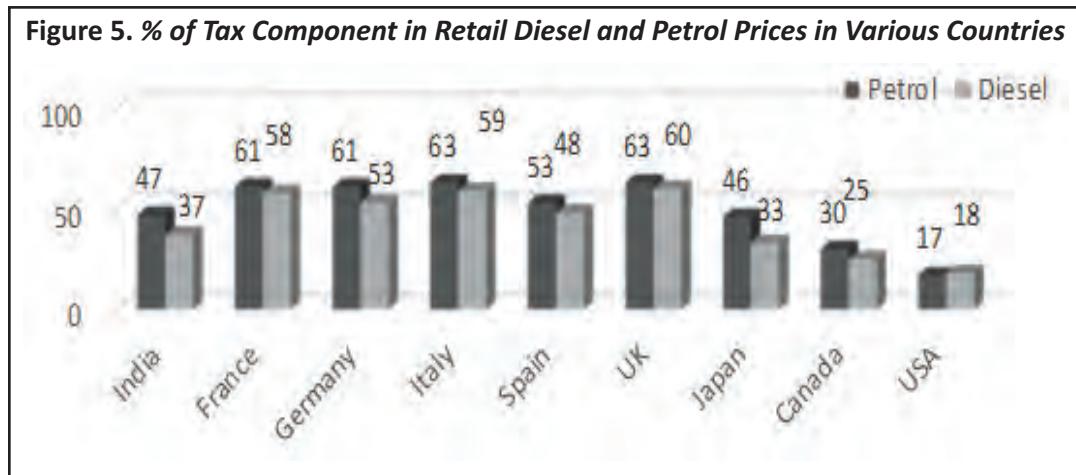


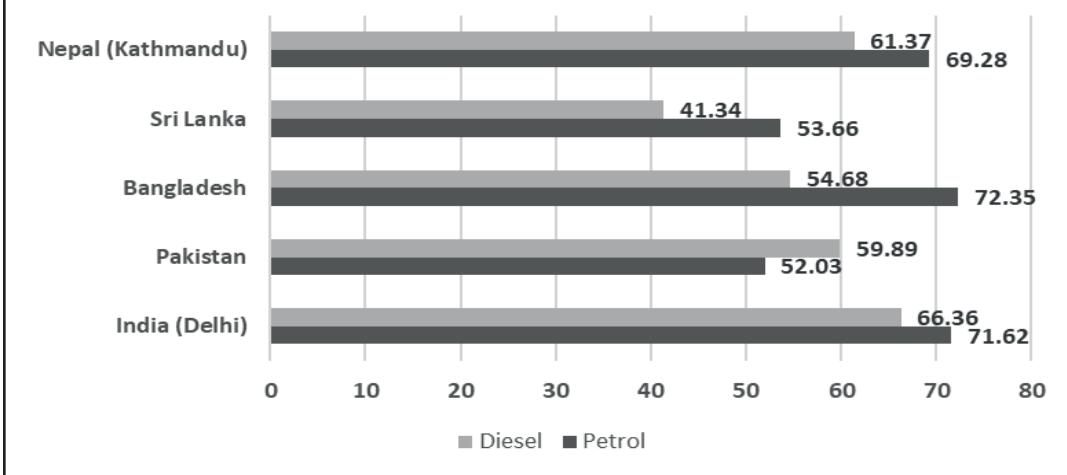
Table 5 shows the comparison of petrol and diesel prices among India, Pakistan, Bangladesh, Sri Lanka, and Nepal.

**Table 5. Retail Selling Price of Petrol and Diesel in India & Neighbouring Countries**

|                   | Petrol | Diesel |
|-------------------|--------|--------|
| India (Delhi)     | 71.62  | 66.36  |
| Pakistan          | 52.03  | 59.89  |
| Bangladesh        | 72.35  | 54.68  |
| Sri Lanka         | 53.66  | 41.34  |
| Nepal (Kathmandu) | 69.28  | 61.37  |

Sources : India – IOCL; Pakistan – Pakistan State Oil ([www.psopk.com](http://www.psopk.com)) ; Bangladesh – Bangladesh Petroleum Corporation ([www.bpc.gov.bd](http://www.bpc.gov.bd)) ; Nepal – Nepal Oil Corporation ([www.nepaloil.com.np](http://www.nepaloil.com.np)) ; Sri Lanka – Ceylon Petroleum Corporation ([www.ceypetco.gov.in](http://www.ceypetco.gov.in)) ; Exchange rate - [www.oanda.com](http://www.oanda.com)

**Figure 6. Retail Selling Price : Comparative Analysis**



From Table 5, it can be observed that countries like Bangladesh and India have high petrol prices (72.35 and 71.62 in INR, respectively). Similarly, the countries India and Nepal have captured the first two places of high diesel price with 66.36 and 61.37 (in INR), respectively.

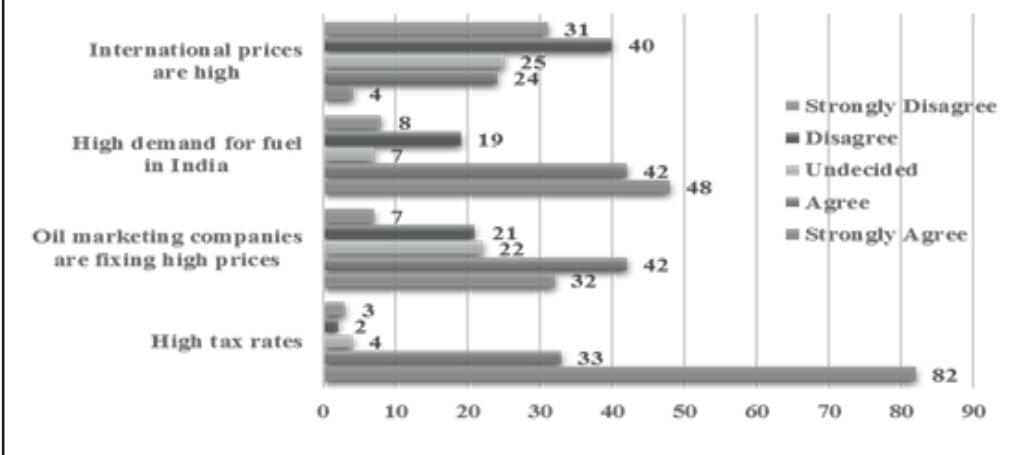
From Figure 6, it is clear that India has the highest retail diesel price and Bangladesh has the highest retail petrol price. The retail price of petrol among these countries is the lowest in Pakistan, and retail diesel price is the lowest in Sri Lanka.

### **Primary Data Analysis**

This section of analysis deals with the analysis based on primary data, that is, analysis based on the data acquired from the consumers. Simple percentage analysis has been used here for understanding the distribution of the respondents towards various study factors. Different type of charts have also been used for clear picturization of analysis. Figure 7 shows the factors' influence on fuel price.

From Figure 7, it can be inferred that majority of the respondents (77.42%) denied and stated that they did not show agreement towards the statement, “Indian fuel prices are high because international prices are high.” Only 22.58% of the respondents agreed with this assertion. Further, the respondents were asked to reply on the demand

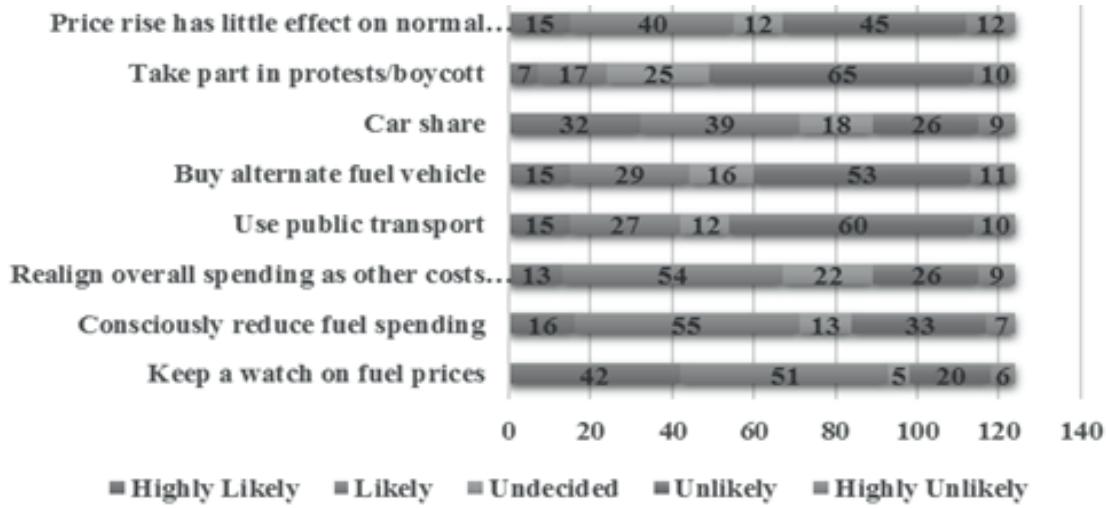
**Figure 7. Factors' Influence on Fuel Price**



side of Indian buyers. Majority of the respondents (72.58%) opined that the prices of fuel are high in India because of the high demand for fuel in India. Accordingly, around 59% of the respondents agreed with the statement, "Oil marketing companies are fixing high prices" and 41% of the respondents did not think that these companies influenced the prices in India. Finally, there was a surprising response from the consumers on the impact of high taxation rates on prices as 91.27% (the highest percentage) of the respondents thought that the high taxation rate in India was the major reason for high fuel prices. Figure 8 depicts the consumers' response towards the price rise of fuel.

Figure 8 reveals that based on the cost aspects, 75% of the respondents followed the changes in fuel prices (kept a watch on fuel prices), 57% of the respondents reduced their fuel spending, and 54% realigned their spending to other costs. It is important to note that 66.13% of the respondents did not show any preference for public transport. Though there was a rise in fuel prices, they mentioned that they preferred their own transport over public transport. Only 33.87% of the respondents were inclined towards using public transport in case of a rise in fuel prices. Out of 124 respondents, only 44 respondents (35.48%) said that they would go for alternate fuel vehicle, but 57.26% of

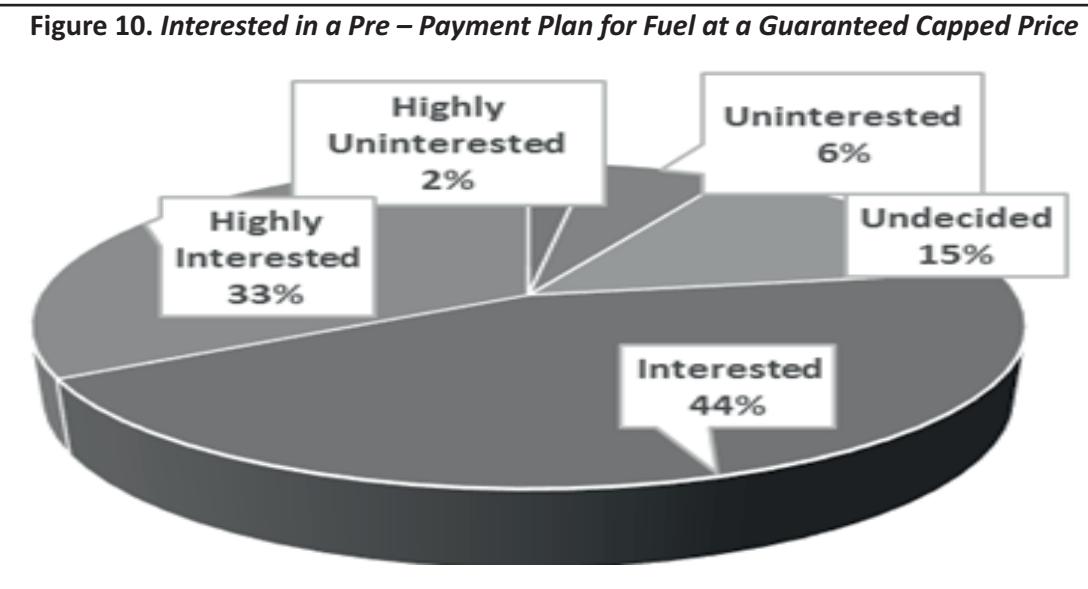
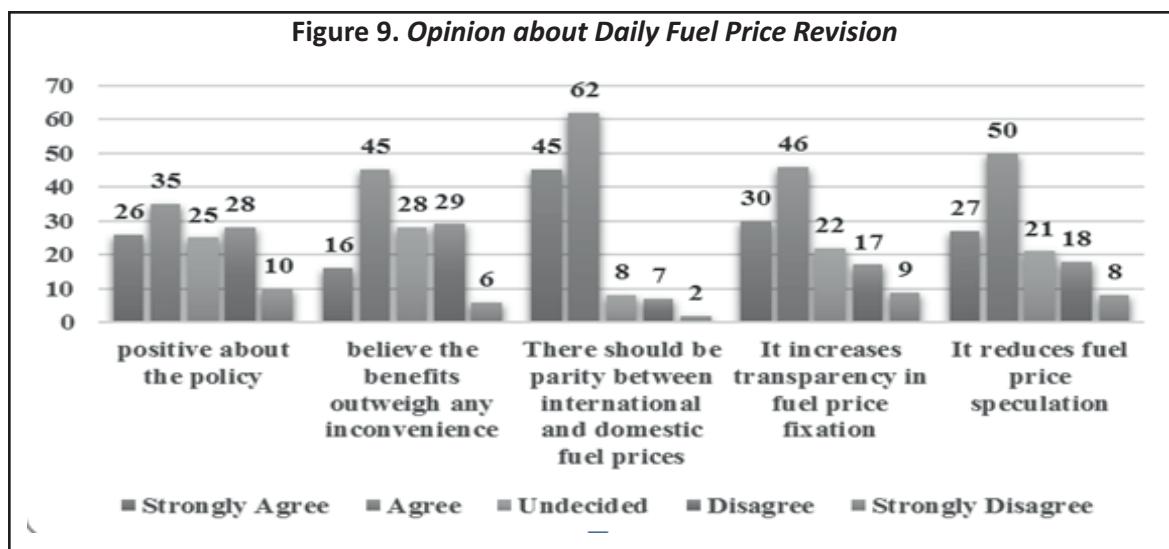
**Figure 8. Likely Response to Fuel Rise**



the respondents indicated their preference of car sharing in case of a rise in fuel prices. In addition to this, it has been found that 60.48% of the respondents were least interested to participate in any protest or boycott activities. In their normal routine life, they showed mix reactions. While 44.35% of consumers responded that the fuel price rise had little effect on their normal routine, 55.65% mentioned that it did not impact their normal routine.

Figure 9 shows the consumers' opinion about the daily fuel price revision. In this survey, it is observed that around 50% of the respondents were positive with this daily revision of prices & believed that the benefits outweighed any inconvenience. Majority of respondents (86.29%) believed that there should be parity between international and domestic fuel charges. In the aspect of transparency, 61.29% of the respondents believed that the daily price revision brings transparency in fuel price fixation, and 62.10% noted that it reduced fuel price speculation in the country.

Figure 10 depicts the interest of consumers in a pre-paying plan for fuel at a guaranteed capped price. It is



observed from the Figure that a majority (77%) of the respondents were inclined towards pre-payment for fuel at a guaranteed capped price. They showed their interest to deposit a specified amount with a vendor.

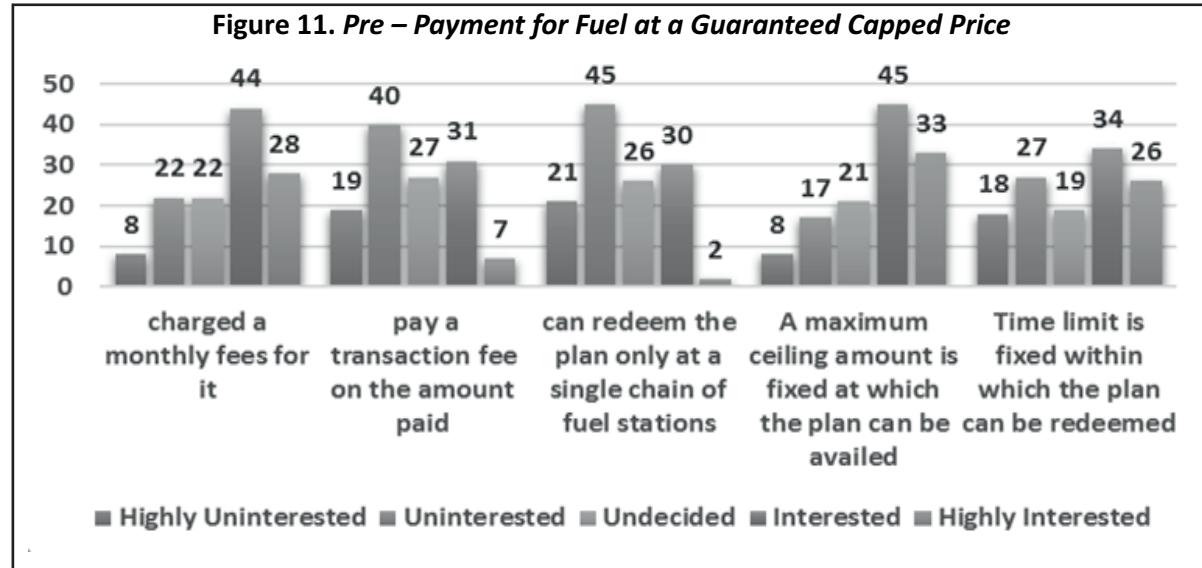
Table 6 shows the detailed view of consumers' interest towards the pre-payment for fuel at a guaranteed capped price. It consists of consumers' response towards the pre-payment factor in terms of the advance payment, monthly fee, transaction fee, redemption, ceiling amount, and time limit. This in-depth analysis has been conducted to verify the feasibility of such plans, if implemented in the future.

Figure 11 shows the clear picture of consumers' response towards the pre-payment for fuel at a guaranteed capped price. The buyers showed mixed reactions when they were asked for pre-payment for fuel at the guaranteed capped price with some conditions. It was observed that around 60% of the respondents were ready to pay monthly fees, but around 70% of the respondents were not inclined towards paying any transaction fee for the same. When the respondents were given an option to redeem the plan only at a single chain of fuel stations, the majority (72.58%) of the respondents rejected this scheme. Buyers were ready for the fixed maximum ceiling amount, and 62.90% of the respondents said that they would like to avail the plan if the maximum ceiling amount is fixed. The majority (51.61%) of the respondents stated that they would not like to have a fixed time limit for this plan.

**Table 6. Pre-payment for Fuel at a Guaranteed Capped Price**

| Particulars   | Highly Uninterested | Uninterested | Undecided | Interested | Highly Interested |
|---|---------------------|--------------|-----------|------------|-------------------|
| Advance payment for fuel at a guaranteed capped price | 3                   | 7            | 18        | 55         | 41                |
| Monthly fee   | 8                   | 22           | 22        | 44         | 28                |
| Transaction fee                                       | 19                  | 40           | 27        | 31         | 7                 |
| Redemption at single point                            | 21                  | 45           | 26        | 30         | 2                 |
| Fixed maximum ceiling amount                          | 8                   | 17           | 21        | 45         | 33                |
| Fixed time limit                                      | 18                  | 27           | 19        | 34         | 26                |

**Figure 11. Pre – Payment for Fuel at a Guaranteed Capped Price**



## Hypotheses

The following hypotheses have been framed for further analysis that helps to achieve the core objectives of this study.

- ↳ **H01** : Decision to prepay for fuel at a guaranteed capped price is not based on monthly fees charged for the plan.
- ↳ **Ha1** : Decision to prepay for fuel at a guaranteed capped price is based on monthly fees charged for the plan.
- ↳ **H02** : Decision to prepay for fuel at a guaranteed capped price is not based on transaction fee charged for each transaction.
- ↳ **Ha2** : Decision to prepay for fuel at a guaranteed capped price is based on transaction fee charged for each transaction.
- ↳ **H03** : Decision to prepay for fuel at a guaranteed capped price is not based on redemption of the scheme at a single-chain outlet of the fuel station.
- ↳ **Ha3** : Decision to prepay for fuel at a guaranteed capped price is based on redemption of the scheme at a single chain outlet of the fuel station.
- ↳ **H04** : Decision to prepay for fuel at a guaranteed capped price is not based on a fixed maximum ceiling amount.
- ↳ **Ha4** : Decision to prepay for fuel at a guaranteed capped price is based on a fixed maximum ceiling amount.
- ↳ **H05** : Decision to prepay for fuel at a guaranteed capped price is not based on a fixed time limit to avail the plan.
- ↳ **Ha5** : Decision to prepay for fuel at a guaranteed capped price is based on a fixed time limit to avail the plan.

To test the hypotheses, the linear regression analysis is employed.  $R$  is the link between the examined and supposed value of a dependent variable. Besides,  $R$  is the squared root of  $R$ -Squared. From the regression table, the  $R$ -value is found.  $R$  Square shows that the percentage of the total variation of the dependent variable – Overall Decision can be explained with five independent variables.  $R$  Square explains how well the sample regression line fits the data. In this research,  $R$  square is noted (.604), which means that 60% of variations in the dependent variable (Overall Decision) is explained jointly by all the (five) variables presented in Table 7. The ANOVA (Table 8) between the five items indicates that there is a significant relationship between the variables under study ( $F=36.012$ ,  $Sig.=0.000<0.05$ ).

**Table 7. Linear Regression Analysis**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | R Square | Change Statistics |          |     |     |               |
|-------|-------------------|----------|-------------------|----------------------------|----------|-------------------|----------|-----|-----|---------------|
|       |                   |          |                   |                            |          | Change            | F Change | df1 | df2 | Sig. F Change |
| 1     | .777 <sup>a</sup> | .604     | .587              | .618                       | .604     | .604              | 36.012   | 5   | 118 | .000          |

a. Predictors: (Constant), Time limit, redeem the plan only at a single chain, charged a monthly fee, a maximum ceiling amount is fixed, transaction fee.

**Table 8. ANOVA<sup>a</sup>**

| Model | Sum of Squares | df      | Mean Square | F      | Sig.   |
|-------|----------------|---------|-------------|--------|--------|
| 1     | Regression     | 68.868  | 5           | 13.774 | 36.012 |
|       | Residual       | 45.132  | 118         | .382   |        |
|       | Total          | 114.000 | 123         |        |        |

a. Dependent Variable : Advanced payment for fuel at a guaranteed capped price.

b. Predictors : (Constant), Time limit, redeem the plan only at a single chain, charged a monthly fee, a maximum ceiling amount is fixed, the transaction fee.

In this research, the 'B' values presented in Table 9 explain the amount of increase in overall satisfaction that would be predicted by 1 unit of increase in the predictor. In this research, three variables show a positive relation and two variables show a negative relationship with the overall decision.

The *t* and significance columns shown in Table 9 are used to examine the null hypotheses. At 95% confidence level, three variables' coefficient value (monthly fee, fixed maximum ceiling amount, and fixed time limit) is less than 0.05, which means that for these variables, the null hypotheses H01, H04, H05 are rejected and it can be concluded that these coefficients are statistically significant and are different than 0, but in case of two variables, the coefficient value (transaction fee and redeem at a single-chain outlet) is more than 0.05, which means that for these variables, the null hypotheses H02, H03 are accepted and it can be concluded that these coefficients are statistically insignificant and are equal to 0.

**Table 9. Coefficients**

| Model | Unstandardized Coefficients  |            | Standardized Coefficients | <i>t</i> | Sig.  | Hypothesis Testing           |
|-------|------------------------------|------------|---------------------------|----------|-------|------------------------------|
|       | B                            | Std. Error | Beta                      |          |       |                              |
| 1     | (Constant)                   | 1.619      | .210                      | 7.701    | .000  |                              |
|       | Monthly fee                  | .219       | .063                      | .275     | 3.496 | <b>.001</b> <b>Supported</b> |
|       | Transaction fee              | -.059      | .083                      | -.071    | -.704 | .483 <b>Not Supported</b>    |
|       | Redemption at a single point | -.040      | .082                      | -.045    | -.488 | .626 <b>Not Supported</b>    |
|       | Fixed maximum ceiling amount | .415       | .063                      | .517     | 6.543 | <b>.000</b> <b>Supported</b> |
|       | Fixed time limit             | .116       | .049                      | .166     | 2.359 | <b>.020</b> <b>Supported</b> |

a. Dependent Variable: Would you be interested in a plan where you can prepay for fuel at a guaranteed capped price?

## Findings and Recommendations

**(1)** Price of Indian crude oil basket has increased over 300% in the last 20 years since the year 2000. In case of price of petrol, the government share is 46.37% (₹ 33.21 / ₹ 71.62) in the form of excise duty and VAT, and in diesel, the same share is 35.56% (₹23.60 / ₹ 66.36) as per Table 2. Though India seems to be charging a high tax rate on fuel, it is not the reality. Facts reveal that Italy, France, UK, and Germany are the countries levying heavy taxes on fuel prices. India is the fourth-lowest country followed by USA, Canada, and Japan as per Table 5. Compared to a few Asian countries, India is the second-largest country charging the highest price for petrol followed by Bangladesh and first in charging the highest price for diesel.

**(2)** International fuel prices are not as high as compared to Indian fuel prices and it is not the only parameter to cause high fuel prices in India. Huge demand from Indian buyers and taxation by the Indian government are the major reasons behind the high fuel prices in India. Buyers were confused about the role of oil marketing companies in fixing the fuel prices in India.

**(3)** Majority of the buyers (75%) kept an eye on fuel prices, and many respondents (57%) preferred to reduce their fuel expenses by using public transport (33.87%), alternate fuel vehicle (35.48%), and car sharing (57.26%). It is also found that 60.48% of the respondents did not want to trouble the government and themselves by participating in protests against the hike in fuel prices because they (55.65%) thought that their daily routine life was not affected by the hike in fuel prices.

**(4)** The study has found that the majority of buyers were positive with daily revision of prices & expected parity between international and domestic fuel charges. Buyers believed that daily price revision brings transparency in fuel price fixation and reduces fuel price speculation in the country.

**(5)** In response to the pre-payment scheme, facts reveal that buyers were inclined towards the pre-payment scheme, and they would opt for this scheme if made available in the market and were ready to deposit a specified amount with a vendor. Mixed responses were obtained from the buyers when they were asked to opt for the scheme with some terms and conditions. It is observed that buyers were inclined towards paying monthly fees and would like to avail the plan if the maximum ceiling amount is fixed, and they were ready to avail the plan if the time limit is fixed within which the plan can be redeemed. It is also observed that the buyers were not ready for paying the transaction fee and redeem the plan only at a single chain of fuel stations.

## **Implications and Conclusion**

Fuel plays a vital role in industrial operations and individual consumption. This research has pointed out the volatility of fuel prices and how consumers respond towards the fluctuations. Higher fuel prices tend to create a burden on production and logistics costs for businesses and consumption expenditures for households. Fuel prices have a direct impact on the prices of goods manufactured using petroleum products. There is an indirect, spillover effect on other products in general on account of the impact on the cost of transportation and logistics throughout the product supply chain. Cost increases could be, partially or wholly, transferred to the consumers, with a trade-off impact on sales volumes. A business would, therefore, expect that a full pass-through of reduction in international prices be reflected in domestic prices. An effective linkage between domestic and international fuel prices supported by a proficient price smoothing mechanism that prevents volatility is likely to be more desirable by the industry.

Spirit of market mechanism gets defeated with government intervention beyond managing the negative impact of price volatility. Global crude oil price downfall has popularly become a tool to clear legacy deficits and create revenue streams with governments. Users understand the purpose and mechanism of automated fuel pricing, but they are not able to receive the real time benefits of the same. It is suggested that policy implementation should be within the purview of the underlying intentions of the market mechanism ensuring transparency and benefits to the users.

## **Limitations of the Study and Scope for Future Research**

This study is limited only to petrol and diesel prices and has not considered CNG and kerosene for this study.

Fuel prices have a direct impact on other commodities. Buyer sentiments will be affected by the spillover impact of automatic fuel pricing. This study does not capture relationships and linkages of fuel prices with other commodities and the consequent impact on buyer behaviour. The inferences and recommendations drawn in this study are limited to the nature of the data and its time line. Also, the analysis results may vary in case of conducting the survey with a larger sample frame.

There is scope for research to gauge deeper insights on consumer acceptance of fuel or fleet cards as an alternative payment method to exercise purchase control and the consequent impact on expenses. Research work on purchase and consumption practices at the individual consumer level which moderate impact of price fluctuations on household budgets will add to the existing body of knowledge on the subject. Scope of the use of business intelligence and predictive analysis to support government decision making may also be explored as tools towards price smoothing.

## **Authors' Contribution**

Dr. Shikha Jain conceptualized the idea and developed qualitative and quantitative design to undertake the empirical study. She extracted research papers with high repute, filtered these based on keywords, and generated concepts and codes relevant to the study design. Dr. Suraj Chandrakant Kamble verified the analytical methods. The instrument for data collection was developed by Dr. Shikha Jain and converted to Google Form by Dr. Suraj Chandrakant Kamble. The inferential analysis was done by Dr. Suraj Chandrakant Kamble using SPSS 25. Dr. Kamble wrote the manuscript in consultation with Dr. Shikha Jain.

## **Conflict of Interest**

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter, or materials discussed in this manuscript.

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