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Should You Buy Or Not? Demand Forecasting For Crude Oil In The UK For The Fiscal Year 2022-23

Aayush Yeole
Indus International school Pune

Abstract-
The objective of this study is to: help energy sector entrepreneurs who are innovating change their course of action in accordance with the data presented in the paper; present data that is useful for shareholders to know when to buy/sell stocks; help policymakers make critical decisions involving the energy sector, specifically crude oil; and help internet users who can use the data presented in this study to support their arguments or any other opinion.
In contrast to the traditional use of micro and macro demand forecasting approaches, which is to predict demand and pricing for goods and services of individual enterprises, this research article intends to derive novel formulas by using these notions to forecast demand for a public good. The goal of this study is to offer data by combining the Time-series forecasting model with various micro and macro demand forecasting methodologies.
The forecasting techniques used in this research article are Bottoms up forecasting, Top-down forecasting, Intuitive forecasting, and Historical forecasting.
These methods of demand forecasting exhibit graphs indicating that demand and prices for crude oil in the UK will increase by over 32%, and that overall yearly spending on crude oil will rise while yearly spending on importing crude oil will fall. Additionally, it can be expected that as the UK begins its road to become one of the world's first few renewable nations, crude oil costs will increase through the end of this fiscal year before gradually starting to decline and steadily minimalizing.

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I. Introduction-

Brexit, the Russia-Ukraine War, the passing of the Queen, the COVID-19 Pandemic, the dispute surrounding the new office of Rishi Sunak, and worldwide inflation are among the events that have broken down the UK shield to its core. By taking advantage of the chances presented by these unfortunate circumstances, the UK must rise again.

These unfortunate circumstances necessitate the most up-to-date knowledge on crude oil pricing and demand, which is lacking given that the majority of current forecasts have predicted prices using outdated data values, which have shown predictions that are very different from what is happening because they are irrelevant and don't take into account any macroeconomic variables and news. This research paper has been created to bridge this knowledge gap.

This research article aims to develop unique formulas by using these ideas to anticipate demand for a public benefit, as opposed to the typical usage of micro and macro demand forecasting methodologies, which is to predict demand and pricing for goods and services of individual firms. The purpose of this study is to provide data by integrating different micro and macro demand forecasting approaches with the Time-series forecasting model.

Due to the geopolitical effects of the Russia-Ukraine conflict on the oil market, as well as the worsening effects of political and social issues brought up in the United Kingdom, this research study focuses on the oil market.

II. Methods-

Bottom-up forecasting-

Bottom-up forecasting is, broadly speaking, the projection of micro-level inputs to estimate revenue for a specific year or series of years. For instance, revenue teams frequently utilise this technique to forecast the company's future performance based on the performance of individual sales or reps.

Bottom-up forecasting enables a more thorough examination of certain items or business models. Bottom-up forecasting enables higher input and output across departments by taking into consideration elements like marketing, hiring costs, production costs, and so forth.

Errors at the micro level are amplified as they approach the macro level, which is one of the main drawbacks of bottom-up forecasting. During the expansion, they are combined hence, it is necessary to challenge the assumptions made and revise them.

Instead of revenue, the money spent on importing crude oil is taken into account in this research piece. To calculate this, the average price of one barrel of crude oil for one financial quarter is multiplied by the average number of barrels purchased during that financial quarter.

In this case the average price of a crude oil is based on predictions made by the department of national statistics and data of the UK. Analogously, the average barrels bought in that financial quarter are dependent on data of the average barrels bought so far this year. This composition could change seasonally.[1]

Regular formula- $Revenue\ Bottoms\ up = Price\ \times Quantity$ [2]
New formula= $Money\ spent\ on\ importing\ crude\ oil = \ Price\ of\ 1 barrel\ of\ crude\ oil (Average\ price = sum\ of\ prices\ for\ each\ month\ divided\ by\ number\ of\ months) \times (Average\ barrels\ bought\ per\ day. Number\ of\ days\ in\ the\ quarter)$

- Quarter 1-

Price of 1 barrel=104.58+112.34+122.71/3=113.21$=94.24GBP
Barrels purchased in quarter 1=1,586, 896 X 91=144,407,536GBP
Total money spent on crude oil in quarter 1 of the financial year of 2022-23=94.24 X 144,407,536GBP=**13,608,966,192.64GBP**

- Quarter 2-

Price of 1 barrel=111.93+100.45+89.76/3=100.713$=83.84GBP
Barrels per day=1,586, 896 X 91=144,407,536GBP
Total money spent on crude oil in quarter 2 of the financial year of 2022-23=83.84 X 144,407,536GBP=**12,107,127,818.24GBP**

- Quarter 3-

Price of 1 barrel=(81.9+75.9)/2=78.9GBP
Barrels per day=1,586, 896 X 92=145,994,432GBP
Total money spent on crude oil in quarter 3 of the financial year of 2022-23=78.9 X 145,994,432GBP = **11,518,960,684.8GBP**

- Quarter 4-

Price of 1 barrel=(78.9+75.9)/2=77.4GBP
Barrels per day=1,586, 896 X 91=144,407,536GBP

[1] Prep. (2022, November 6). *Bottom-Up Forecasting*. Wall Street Prep. Retrieved January 30, 2023, from https://www.wallstreetprep.com/knowledge/bottoms-up-forecasting/.

[2] office. (2022, March 25). *Economic and fiscal outlook - March 2022 - Office for Budget Responsibility*. Office for Budget Responsibility. Retrieved January 30, 2023, from https://obr.uk/efo/economic-and-fiscal-outlook-march-2022/.

Total money spent on crude oil in quarter 4 of the financial year of 2022-23= 77.4 X 144,407,536GBP=**11,177,143,286.4GBP**[3]

Top-down forecasting

By beginning with high-level market data and working "down" to revenue, top-down forecasting is a technique for predicting a company's future performance. This strategy begins by looking at the big picture before focusing on a particular business.

Top-down financial forecasting has the advantage of avoiding statistical outliers, or the data swings, that are typical of lower-level facts and figures. As a result, a top-down strategy gives businesses a more comprehensive view of their income potential and can assist them in identifying sales patterns.

The largest one is that because it is founded on generalisations rather than a strategy to reach a goal, it may be unduly optimistic or wrong. Investors may be interested in an upbeat prognosis, but they will want to see a convincing operational plan for reaching it.

The total addressable market is being assumed to be the Real GDP of that quarter and to calculate the market share the predicted money spent on crude oil for that quarter is being converted into percentage in accordance to the predicted real GDP of that quarter.

The real GDP predicted values have been taken from the predictions made by the national bureau of statistics UK. The predicted money spent on crude oil is being taken from Statistica.com These data values could change with change in geopolitical/economic situations that may be unanticipated.[4]

Regular formula= $TAM\ or\ Total\ addressable\ market \times \%Of\ market\ share$ [5]

New formula=$Real\ GDP\ of\ quarter \times \{(Money\ spent\ on\ crude\ oil \div Real\ GDP)100\%\}$

$\{(Money\ spent\ on\ crude\ oil \div\ Real\ GDP) \times 100\}\ for\ fiscal\ year\ 2021-22$

30,000,000,000/2667159000000.00=**1.125%=***0.01125*

- Quarter 1 of 2022-23-

33,345,952,911,815.80 X *0.0112479233522*=**3,75,07,27,22,458.17**

- Quarter 2 of 2022-23-

33,679,412,440,933.958 X *0.0112479233522*=**3,78,82,34,49,682.76**

- Quarter 3 of 2022-23-

34,184,603,627,547.96727 X *0.0112479233522*=**3,84,50,58,01,428**

- Quarter 4 of 2022-23-

3,46,26,44,96,63,823.4469427 X *0.0112479233522*=**3,89,47,56,51,777.5**[6]

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[3] Payroll. (2021). *Financial Year 2022-23: Important Dates to Remember*. BrainPayroll. Retrieved January 30, 2023, from https://www.brainpayroll.co.uk/blog/financial-year-2022-23-important-dates-to-remember.

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Oil Information, IEA, 1997 Edition IEA Reports Decline in OECD Countries' Imports of Middle East Oil. (1997, December). *Energy Exploration & Exploitation*, *15*(6), 547–547. https://doi.org/10.1177/014459879701500629

[4] Institute. (2022, October 13). *Top-Down Forecasting*. Corporate Finance Institute. Retrieved January 30, 2023, from https://corporatefinanceinstitute.com/resources/financial-modeling/top-down-forecasting/.

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Intuitive forecasting

Based on the representatives' predictions of whether or not each opportunity will close within a certain time frame, intuitive forecasting is made. Reps typically have a positive outlook on their ability to clinch a transaction, making it a highly subjective choice.

This approach may be relatively accurate if applied appropriately and if the sales representatives can accurately ascertain the intents of their prospects. Companies can consider potential scenarios that could affect revenue predictions with intuitive sales forecasting.

Absent Details while intuitive forecasting techniques generate the precise data needed to make vital judgements, they may lack experience and intuition. Businesses cannot take into consideration external elements that can only be identified after years of industry expertise using this form of forecasting.

Intuitive forecasting has been used here to predict trends in demand for crude oil in the UK in accordance to recent geopolitical and economic occurrences as well as anticipated future events that may affect the demand and prices for crude oil.

All the results presented in this type of forecasting are based on the intuition of the author so, they may or may not be right. [7]

III. Method-

Long-term demand for crude oil in the UK will decline, but short-term pricing and demand will rise due to a variety of events, including the Russia-Ukraine war, Brexit, the death of the queen, the new prime minister taking office, and higher unemployment.

Brexit is the term used to refer to the United Kingdom's decision to leave the European Union. Political unrest is primarily due to Brexit, which has infuriated many individuals. Additionally, the controversial election of Rishi Sunak and the passing away of the queen have sparked uprisings and social unrest.

The UK has condemned the actions of its former allies and prohibited the import of crude oil from Russia. Prices have increased to create a new equilibrium as a result of the shortfall in supply that was brought on by this. In addition, the need for crude oil has increased as the nation's population has grown. Throughout the 2022–2023 fiscal year, these unfortunate events will raise crude oil prices and demand; however, at the start of the following fiscal year, demand and prices will begin to gradually decline as a result of appropriate policymaking, business responses, and other responses from stakeholders to the rising demand for crude oil.

These occurrences have had a net negative effect on the country's economy because of the unstable political and social climate, rising unemployment rates, a 0.2% decline in real GDP[8], and rising crude oil prices that have caused consumers to spend more on non-renewable energy sources and reduced their ability to pay taxes or invest in the stock market.

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IV. Historical forecasting

Using historical data as inputs, forecasting is a process that produces accurate predictions of the future course of trends. Businesses use forecasting to decide how to spend their budgets and make plans for upcoming expenses.

Even though using historical data for forecasting might provide its own set of challenges, it can be a useful tool for businesses that already have the data. Companies choose to use historical forecasting since it is a rapid way to forecast sales. This analysis of factual data establishes a baseline for current sales. Using this forecasting technique, businesses may also estimate client conversion rates and the potential value of each sale. For sluggish markets, historical sales forecasting is the best strategy. Because historical sales can serve as an effective barometer for future sales and increase forecasting accuracy for a company, markets that don't fluctuate and are reasonably stable can use this sales forecasting strategy.

While some businesses utilise historical sales forecasting and believe it to be a reliable technique of predicting sales, other businesses may find this forecasting strategy to be a burden and a source of forecasting errors. One reason why this forecasting method wouldn't be the best for scenario planning is that it doesn't account for market anomalies and seasonal fluctuations. The COVID-19 pandemic is a prime illustration of how incorrect historical forecasts can be. Because the COVID pandemic has decreased revenues for many organisations, if businesses had utilised historical data to forecast current sales, they would have overstated their sales revenue. Because corporate revenue will probably be substantially higher when the pandemic is ended than it is now, utilising data from the outbreak to forecast future sales is likewise incorrect.

Historical forecasting has been used here to calculate and depict growth/ decline in prices of one crude oil barrel in the UK.

Future prices used in this forecasting method have been forecasted and these values could change in the future or be inaccurate. The data for past prices is hard to find. The past data is highly just estimates because of lack of technology and information when the calculations were made.[9]

Regular formula- $\{[(Sales\ from\ Year\ 2 - Sales\ from\ Year\ 1) \div Sales\ from\ Year\ 1] \times 100\} = Historical\ Growth\ Percentage$ [10]

New formula=

$$\{(Predicted\ price\ average\ of\ one\ crude\ oil\ barrel\ in\ the\ UK\ for\ the\ fiscal\ year\ 2022\ to\ 23 - average\ price\ of\ one\ crude\ oil\ barrel\ in\ the\ UK\ for\ the\ fiscal\ year\ 2021\ to\ 22) \div average\ price\ of\ one\ crude\ oil\ barrel\ in\ the\ UK\ for\ the\ fiscal\ year\ 2021\ to\ 22 \times 10\} = Growth\ or\ Decline\ \%$$

- (Predicted price average of one crude oil barrel in the UK for the fiscal year 2022-23- average price of one crude oil barrel in the UK for the fiscal year 2021-22/average price of one crude oil barrel in the UK for the fiscal year 2021-22 X 100%) =Growth/decline percentage

(103.71-70.68)/103.71 X 100%=**31.85%**

- Average price of crude oil in financial year of 2021-22 in UK- Average Price of crude oil in financial year of 2020-21 in UK/ Average Price of crude oil in financial year of 2020-21 in UK x 100%)=growth/decline in prices in percentage

(70.68-41.96)/41.96 X 100%=**68.45%**

- Price of crude oil in financial year of 2020-21 in UK- Price of crude oil in financial year of 2019-20 in UK/ Price of crude oil in financial year of 2019-20 in UK x 100%)=growth/decline in prices in percentage

(41.96-64.3)/64.3 X 100%=**-34.74%**

- Price of crude oil in financial year of 2019-20 in UK- Price of crude oil in financial year of 2018-19 in UK/ Price of crude oil in financial year of 2018-19 in UK x 100%)=growth/decline in prices in percentage

[9]Akucast. (2020, October 5). *Winning Tactics For Historical Sales Forecasting Akucast.* Akucast. Retrieved January 30, 2023, from https://www.akucast.com/forecasting/winning-tactics-for-historical-sales-forecasting/.

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(64.3-71.34)/71.34 X 100%=**-9.87%**

- Price of crude oil in financial year of 2018-19 in UK- Price of crude oil in financial year of 2017-18 in UK/ Price of crude oil in financial year of 2017-18 in UK x 100%)=growth/decline in prices in percentage

(71.34-54.25)/54.25 X 100%=**31.5%**

- Price of crude oil in financial year of 2017-18 in UK- Price of crude oil in financial year of 2016-17 in UK/ Price of crude oil in financial year of 2016-17 in UK x 100%)=growth/decline in prices in percentage

(54.25-43.67)/43.67 X 100%=**24.23%**

- Price of crude oil in financial year of 2016-17 in UK- Price of crude oil in financial year of 2015-16 in UK/ Price of crude oil in financial year of 2015-16 in UK x 100%)=growth/decline in prices in percentage

(43.67-52.32)/52.32 X 100%=**-16.53%**

- Price of crude oil in financial year of 2015-16 in UK- Price of crude oil in financial year of 2014-15 in UK/ Price of crude oil in financial year of 2014-15 in UK x 100%)=growth/decline in prices in percentage

(52.32-98.97)/98.97 X 100%=**-47.14%**

- Price of crude oil in financial year of 2014-15 in UK- Price of crude oil in financial year of 2013-14 in UK/ Price of crude oil in financial year of 2013-14 in UK x 100%)=growth/decline in prices in percentage

(98.97-108.56)/108.56 X 100%=**-8.8%**

- Price of crude oil in financial year of 2013-14 in UK- Price of crude oil in financial year of 2012-13 in UK/ Price of crude oil in financial year of 2012-13 in UK x 100%)=growth/decline in prices in percentage

(108.56-111.63)/111.63 X 100%=**-2.75%**

- Price of crude oil in financial year of 2012-13 in UK- Price of crude oil in financial year of 2011-12 in UK/ Price of crude oil in financial year of 2011-12 in UK x 100%)=growth/decline in prices in percentage

(111.63-111.26)/111.26 X 100%=**0.33%**

- Price of crude oil in financial year of 2011-12 in UK- Price of crude oil in financial year of 2010-11 in UK/ Price of crude oil in financial year of 2010-11 in UK x 100%)=growth/decline in prices in percentage

(111.26-79.47)/79.47 X 100%=**40%**

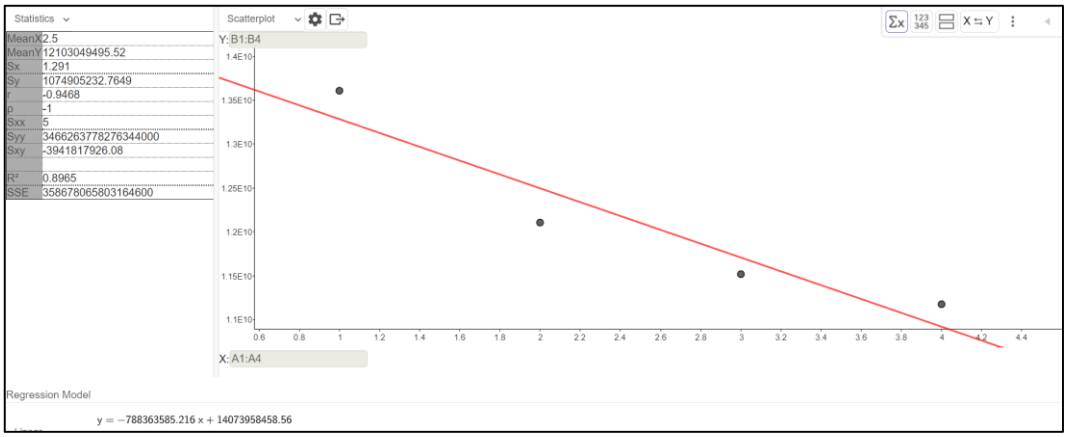
- Price of crude oil in financial year of 2010-11 in UK- Price of crude oil in financial year of 2009-10 in UK/ Price of crude oil in financial year of 2009-10 in UK x 100%)=growth/decline in prices in percentage

(79.47-61.51)/61.51 X 100%=**29.2%**[11]

V. Results-

Bottum up forecasting

X-axis=Financial quarters (2022-23) and Y-axis=Money spent on importing crude oil in the UK (GBP)

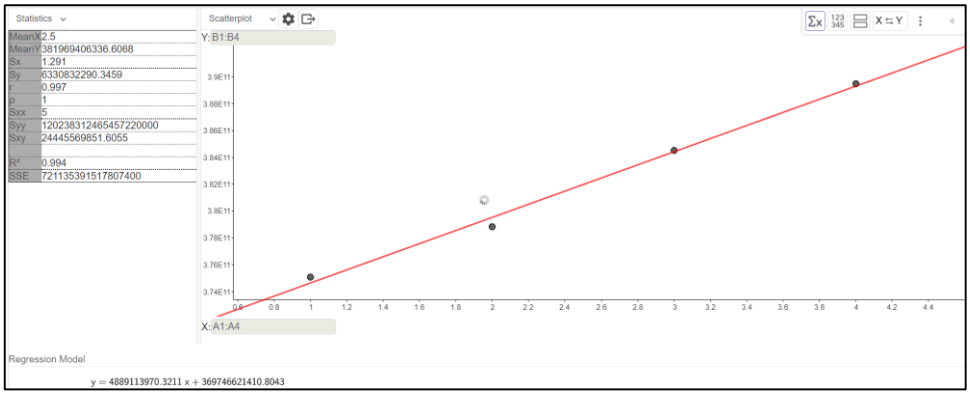


[11] Statista. (2021, November 2). *Oil prices forecast UK 2022 | Statista*. Statista. Retrieved January 30, 2023, from https://www.statista.com/statistics/374961/united-kingdom-uk-oil-price-forecast-in-gbp/.

Financial year of 2022-23 in the UK	Money spent on importing crude oil in the UK (British pound sterling)
Quarter 1	13,608,966,192.64 GBP
Quarter 2	12,107,127,818.24 GBP
Quarter 3	11,518,960,684.8GBP
Quarter 4	11,177,143,286.4 GBP

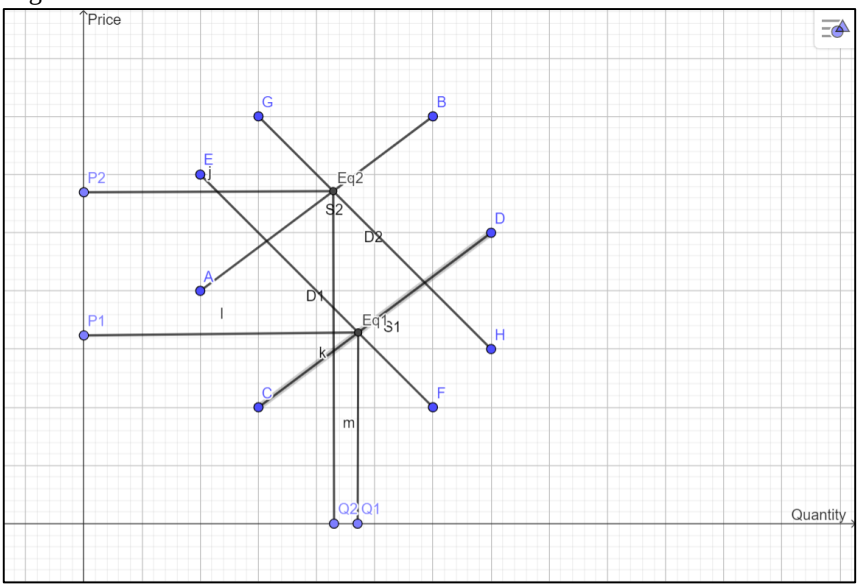
Top-down forecasting

X-axis=financial quarter(2022-23) and Y-axis=Total money spent on crude oil in the UK (GBP)



Financial year of 2022-23 in the UK	Total money spent on crude oil in the UK (British pound sterling)
Quarter 1	375,072,722,458.175 GBP
Quarter 2	378,823,449,682.756 GBP
Quarter 3	384,505,801,427.998 GBP
Quarter 4	389,475,651,777.498 GBP

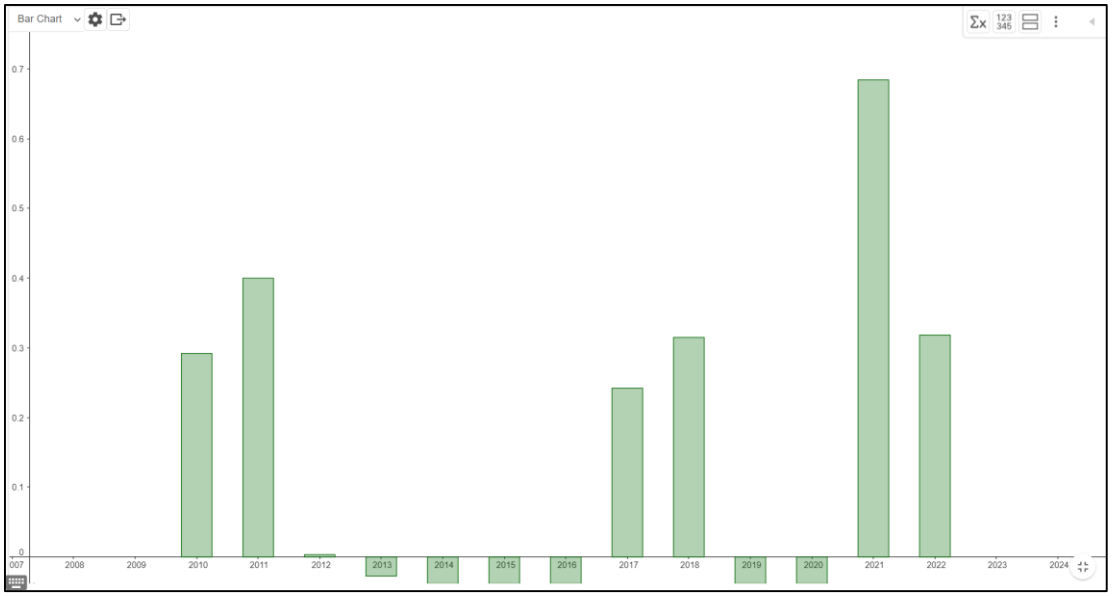
Intuitive forecasting



The United Kingdom banned the import of any goods or services from Russia in retaliation for those countries' hostilities with Ukraine. Consequently, there was a supply shortfall that persisted for a while before a new equilibrium with much lower supply and higher pricing was formed. Additionally, the country's population growth caused the demand curve to shift upward, indicating increased demand.

Historical forecasting

X-axis=year and Y-axis=growth. Decline in prices of crude oil.



Year	Growth or decline in prices of crude oil (%)
2010	29.2%
2011	40%
2012	0.33%
2013	-2.75%
2014	-8.834%
2015	-47.14%
2016	-16.53%
2017	24.23%
2018	31.5%
2019	-9.868%
2020	-34.74%
2021	68.446%
2022	31.848%

VI. Discussion-

The results of this study suggest that although crude oil prices and demand would rise during the budgetary year 2022–2023, they will gradually fall as the UK's reliance on crude oil reduces. The UK's crude oil prices were declining from 2012 to 2016; however, this trend was halted due to reductions in the country's output. This pattern may be seen in the bar graph for historical forecasting.

Since this paper uses unconventional forecasting techniques and the results are sensitive to macroeconomic variables like the Real GDP of the UK, in contrast to typical approaches that just focus on data, the conclusions presented here are considerably different from those in previous works. These forecasting methods have the advantage of giving the reader a clear notion of what will happen without providing the exact numbers that data-intensive models like the time series model can.

This research article focuses on combining historical forecasting, intuitive forecasting, bottom-up forecasting, and top-down forecasting to present data and forecasts on the price, supply, and demand of crude oil in the UK and their future. The goal of this study was to assist energy entrepreneurs, assist shareholders in making judgements by analysing the data supplied, and assist the British government in making decisions. This research has provided extremely useful information that cannot be accessible online and has paved the way for others to use the information to undertake additional research. This study doesn't offer a straightforward prediction of crude oil prices in the UK for the fiscal year 2022–2023; instead, it offers estimates of the growth and decline in crude oil prices annually, forecasts of future crude oil demand, the estimated cost of importing crude oil, and the estimated total amount of money that will be spent on crude oil in the UK for each quarter.

VII. Evaluation-

Bottom-up forecasting is, broadly speaking, the projection of micro-level inputs to estimate revenue for a specific year or series of years. For instance, revenue teams frequently utilise this technique to forecast the company's future performance based on the performance of individual sales or reps. By beginning with high-level market data and working "down" to revenue, top-down forecasting is a technique for predicting a company's future performance. This strategy begins by looking at the big picture before focusing on a particular business. Based on the representatives' predictions of whether or not each opportunity will close within a certain time frame, intuitive forecasting is made. Reps typically have a positive outlook on their ability to clinch a transaction, making it a highly subjective choice. Using historical data as inputs, forecasting is a process that produces accurate predictions of the future course of trends. Businesses use forecasting to decide how to spend their budgets and make plans for upcoming expenses.

When combined with data and statistics, all of these tactics for micro and macro demand forecasting show promise, but the **historical forecasting technique**, which produced results that were comparable to real-time data and statistics, is the best at predicting trends.[12]

VIII. Conclusion-

The study's findings imply that even while demand and price for crude oil will increase in the financial year 2022–2023, they will eventually decline as the UK's reliance on crude oil decreases. From 2012 to 2016, the price of crude oil in the UK was falling; however, this trend was reversed as a result of decreases in the nation's output.

Under the conditions described in this research paper, integrating micro and macro demand forecasting with the time series forecasting technique to include more data and statistics proved to be more accurate, but time series and micro and macro demand forecasting are typically more appropriate to be used for their respective purposes. Therefore, it is best to use your judgement and select the approach to utilise based on the situation.

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