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Identifying the Spillover Effects of Domestic Oil Price Hike in the Inflation of Bangladesh

Ms. Rifat Ara Bindu[1]
Md. Sajjad Hossain[2]

Abstract

This study purposes to analyze the effects of the recent oil price hike (fuel prices oil) on the inflation rate in Bangladesh. The estimation process of this study utilizes the monthly secondary data from July 2013 to September 2022 available from different sources (like; Bangladesh Petroleum Corporation, World Bank) by using the VECM approach. The rate of inflation is the dependent variable in the estimation process, domestic and global oil prices are our independent variables, and the broad money supply is included as a control variable. A simple Correlation Matrix is also done to observe the connection among the variables. The result of this study indicates a statistically significant long-run relationship among domestic oil prices, broad money supply, and the inflation rate of Bangladesh, but world oil prices show statistically insignificant results. Besides, this is consistent with theory, and the short-run adjustment coefficient has a statistically significant with negative sign, implying that long-run equilibrium is stable in the presence of any short-run shocks in oil prices. In the short run, the inflation rate is extremely high when oil prices hike, and as time goes on, the inflation rate will be adjusted in the long run. This finding is informative to policymakers or experts for formulating monetary and fiscal policies as well as providing important insights for the handling of inflation.

Keywords: Inflation, Oil price, Co-integration, VECM

JEL Classidication: E31, E610, Y10.

[1] Assistant Director, Research Department, Bangladesh Bank.

[2] Assistant Director, Research Department, Bangladesh Bank.

The views expressed in this paper are solely of the authors and do not necessarily reflect the views of the institution in which they work.

1. Introduction

Oil is a major component of almost all services and goods, similar to in other nations, and it significantly affects people's lives in Bangladesh as well. As a fuel, it is considered the engine of an economy because it has a broad scope of applications, supplying various sectors of a nation, including agriculture, transportation sector, industry, and households. Therefore, when oil prices are imbalanced and unreasonable, people's quality of living fluctuates. This is because, any changes in oil prices may influence the prices of other commodities directly or indirectly which may influence the quality of living standard of people. Bangladesh is an oil-importing nation, thus it is crucial to understand how rising oil (fuel oil) prices may affect inflation. Naurinetet al. (2016) found Consumer Price Index is positively affected by any surge in oil prices. Lacheheb & Sirag (2019), utilizing annual data and applying nonlinear autoregressive distributed lags (NARDL), also found a significant positive relationship between oil price increase and the inflation rate in Algeria. In a word, oil prices are one of the important determinants or influential factors of inflation for an oil-importing country like Bangladesh because they may influence macroeconomic activities in both supply-side and demand-side channels. As demand-side channels, consumer spending and government spending raised due to rising commodity price which are a result of oil price hike. In this way, oil price hike influences the inflation through demand side channel. Additionally, a rise in oil prices triggers supply-side shocks, which might cause production costs to become a driving force behind cost-push inflation. So, the cost of production rises due to oil price hikes, it may contribute to increasing inflation by influencing the different channels of the economy. According to Haque (2007).), if domestic oil prices are allowed to rise in line with global oil prices, the entire economy will suffer from higher inflation, and the government's efforts to national poverty reduction program will severely harm. During 2021, the world's economy became more volatile, and oil prices increased for oil-importing countries. This is because, at the beginning of the pandemic, a global lockdown caused a huge fall in demand for oil, and as a result, the price of global oil also fell. On the other side, after the lockdown eased, oil exporting countries made allies to artificially increase the global oil price. Such ups and downs made the global oil market volatile. In this volatile global oil market situation, Bangladesh Petroleum Corporation (BPC) reported that it faced huge losses of around $85 million (in the first seven months of 2022) on oil sales.

Consequently, BPC announced to increase the domestic oil price in two phases. The first is in November 4, 2021, when the Bangladesh government raised diesel and kerosene prices by 23 percent. Accordingly, in August 2022, BPC again raised oil prices by 40 to 50 percent, the highest price since Bangladesh's independence. The reason behind this is that

the Bangladesh government recently decided to adjust domestic oil prices in line with global oil prices. Besides, the general public of Bangladesh uses other fuels too, like CNG, LNG, and LPG, but most public transportations like trains or other motor vehicles utilize fuels like diesel, patrol or octane, etc. Furthermore, diesel or patrol fuel is used in agricultural irrigation or other machinery. So, all three sectors of the Bangladeshi economy—the agricultural, industrial, and service sectors—were affected directly or indirectly by the oil price hike. This huge oil price hike is also significantly influencing non-food inflation in Bangladesh, which affects the people's purchasing power, standard of living, and real income. According to Saha et al. (2018), the increasing oil price is not a good sign for Bangladesh's economy because it might negatively affect economic growth in the short run as well as long run.

The basic goal of this study is to visualize the correlation between the increase in oil prices and the resulting inflationary impact on the economy of Bangladesh. However, for this purpose, this study analyses the secondary data available from different sources and adopts the Vector Error Correction model in the estimation process to find out the long-run association between the domestic oil price and inflation in Bangladesh. A correlation matrix is also used to examine the relationship between domestic oil prices (diesel, petrol, and octane) and world oil prices with the inflation rate. The correlation matrix shows a positive relationship between oil prices and the inflation rate. Other than this technical analysis, this study also incorporates the real scenario of the impacts of global and domestic oil prices hike in the overview section. The rest of that study is arranged as follows; section 2 reviews the literature, section 3 describes a brief overview of oil price and inflation in Bangladesh, section 4 exhibits the data and methodology with the interpretation of the results of the study, and section 5 offers policies and explains conclusion.

2. Literature Review

Though there is some research on how global oil price shocks may affect domestic inflation rates, there is very little study on domestic oil price hikes and its impacts on inflation in the context of Bangladesh. For this reason, the study pursued to find out the recent domestic oil price adjustment with the global oil price and how it affects inflation in Bangladesh. These previous literatures included in this study to explain any shocks or increase in domestic or global oil price how create impact on inflation in Bangladesh as well as different economy.

For five SAARC countries, Ahmed et. al. (2017) tried to investigate the effect of oil price shocks on real GDP, interest rates, inflation, and currency rates (India, Pakistan,

Bangladesh, Sri Lanka, and Bhutan). However, they utilized time series data from 1982 to 2014 using the modeling technique known as the impulse response function and forecast error variance decomposition approach in the structural vector auto regression (SVAR) context. Additionally, the co-integration approach proposed by Johansen and Juselius (1990) is also implied for long-term relationships. According to the findings, the macroeconomic determinants, however, were found to be sensitive to even slight changes in oil prices.

Rahaman et. al. (2020) used the co-integration method and a vector error correction model to investigate the effects of oil price shocks on CPI of Bangladesh. According to the results, there is a poor correlation between Bangladesh's CPI and international oil prices. Contrarily, the broad money supply, a control variable, had a statistically significant positive influence on the CPI. The study's most significant conclusion is that the long-run equilibrium is unstable when there are short-term shocks since the short-run adjustment coefficient was statistically significant and had a positive sign.

Hussain & Zaman (2008) conducted a study on understanding inflation in Bangladesh, showing how the administrative price of oil might increase inflation very fast. The results from this study suggested that the increased administrative oil prices indirectly stimulating non-tradable inflation. It is clear from this study upward adjustment of domestic fuel prices was likely to have caused a spike in inflation and extended in rural and urban areas. Besides, due to indirect effects, oil prices pass through to the rest of the economy.

Taslim & Hossain (2015) applied the time series technique and found evidence that even though the domestic price and world price of oil grow together in the long run, the speed of adjustment towards equilibrium is not symmetric: positive shocks are transmitted at a faster rate compared with the negative ones. When global prices increase, domestic prices respond positively almost instantly, but domestic prices do not reflect the same fluidity when global prices decline. The fact that business collaboration prevents price flexibility in the downward direction is essential information for the policymaker.

Using monthly data from January 2000 to December 2014, Asghar & Naveed (2015), explored the pass through of global fuel prices to inflation of Pakistan. They applied Autoregressive Distributed Lag (ARDL) bounds testing approach to investigate the long run pass through of world oil prices to domestic inflation in Pakistan with a control variable, i.e., exchange rate. Based on the empirical results of the estimation procedure, the exchange rate and long-run international oil prices considerably impact Pakistan's inflation rate. Furthermore, the oil price has a positive association with inflation, and nominal exchange rate has a negative association with the inflation rate in Pakistan.

Sultana & Uddin (2018) conducted a study to overview the international oil price and Bangladesh by using secondary data from newspapers, websites, periodic journals, reviews, and various published data. In addition, this paper investigated the impact of the sharp fall in the world's oil price on Bangladesh's Economy. It finds out that there is a negative connection between Bangladesh's oil price and the global oil price.

Kose & Ünal (2021) perused to find out the effects of the oil price and oil price volatility on inflation in Turkey by applying the SVAR model, utilizing the data for the month between March 1988 and August 2019. In the estimation procedures, they implied variance decomposition. The findings of the variance decomposition indicated that the impact of oil prices and the oil price volatility on inflation were slight in the early month but increased with the month went on. This result of this research provided important dynamics to control inflation. This paper suggested that turkey can adopt three important policies such as energy policy along with both fiscal and monetary policies. A proper and dynamic energy policy where the oil resources are a significant component of inflation in a country like Turkey helps to manage inflation on time.

Talha et al. (2021) endeavored to examine the effect on specific macroeconomic indicators such as inflation and the country's oil prices, energy consumption, and gross domestic product. For this purpose, they applied year-to-year information from the 1986 to 2019 series. This research study estimated regression model, correlation model, and descriptive analysis to break down the information about oil prices, energy consumption, economic growth, and inflation rate. The findings of this research study revealed how oil prices, energy consumption, and economic growth positively affect the inflation rate in Malaysia.

Nasir et al. (2019) attempted to investigate the influence of the oil price shock in the Gulf Corporation Council (GCC) members' counties, and in this study, they applied a structural Vector auto-regression (SVAR) model for the period 1980–2016. They found the significant positive effects of oil price shocks on inflation and other variables like GDP and trade balance. In respect to inflation, there are also significant variations in how much oil shocks affect the overall price, which signals that the GCC's monetary policies might experience various difficulties in achieving price stability for such shocks. Though the GCC's countries are oil-exporting countries, those countries are struggling to handle inflation when the price of oil fluctuates.

Hammoudeh & Reboredo (2018), analyzed the connection between inflation expectation and oil prices by implying a Gaussian affine term structure model in the United States. This research work revealed that the effect of oil price changes on inflation expectations is stronger.

Using imperial data from 2000 to 2021, Abuselidze (2022) intended to assess the effects of changes in oil prices on inflation dynamics. In this study, a correlation-regression analysis is applied to examine the impact of the increase in petroleum products on generating inflation.

Khan & Malik (2016) aimed to determine the increase in oil prices pass through to producer price index and consumer price index for Pakistan Economy. For this purpose, the study applied the recursive VAR model to examine the pass through of oil prices to inflation in Pakistan from July 1991 to December 2015. This study found that the oil price has a moderate impact on domestic inflation.

Pradeep (2022) investigated the effects of the recent diesel price hike on the Indian economy. Using the (NLADL) model with the Augmented Phillips Curve framework, this research analyzes the effects of diesel price reform pass through on domestic prices. This study concluded that the diverse influence of diesel price reform across sectors was very useful for policymaking.

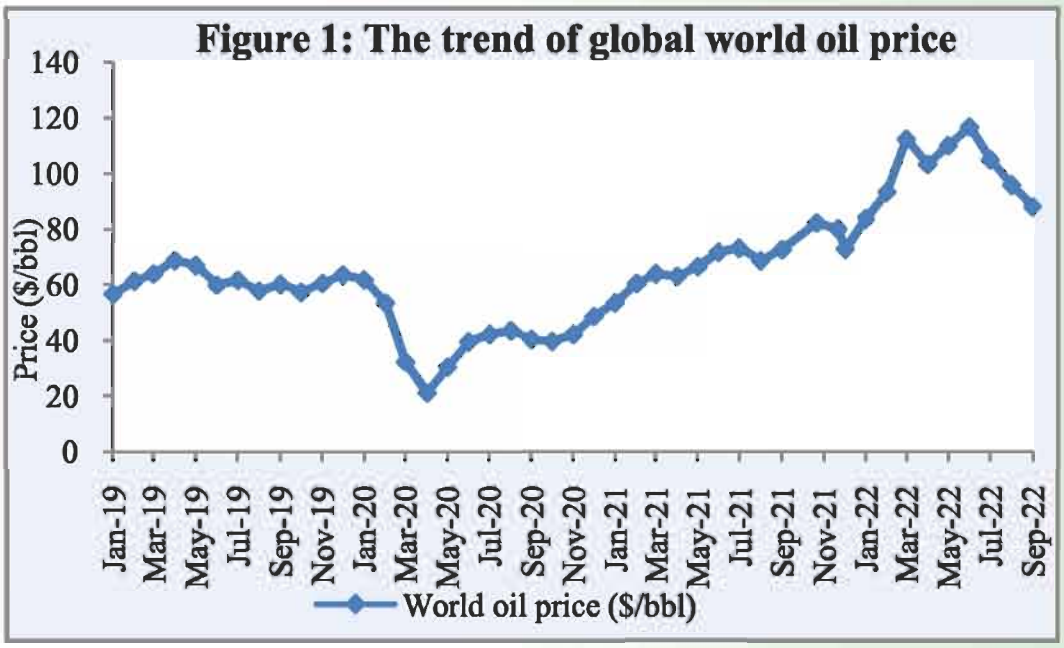
Choi et al. (2017) used an unbalanced panel data from 1970 to 2015 for 72 advanced and developing economies to examine how the oil price changed affect domestic inflation. They discovered that a 10 percent increase in global oil prices caused an average increase in local inflation of roughly 0.4 percentage points, which lasted for two years. Additionally, they found that the effect was asymmetrical, with positive oil price shocks having a larger effect than negative ones. The findings of this study pointed out that the portion of transport sector on CPI basket and energy subsidies are the most vigorous factors in the explaining of the effects of oil price shocks.

Bass (2019) aimed to describe the effect of world oil price shocks on inflation dynamics in Russia by using a VECM model. The outcome of the research work exhibited that oil prices, exchange rates, and consumer inflation are co-integrated in the long run in Russia.

3. Overview of Oil Prices and Consumer Prices

3.1. Current scenario of global oil price and domestic oil price

Every country in the world experiences the effect of changes in world oil price as a global phenomenon. Due to the financial instability and vulnerability to external shocks, emerging countries' economies are particularly susceptible to the impact of the oil price. The world price of oil is one of the main drivers of the rate of inflation and variations in pricing in developing countries, including Bangladesh.



Source: World Bank

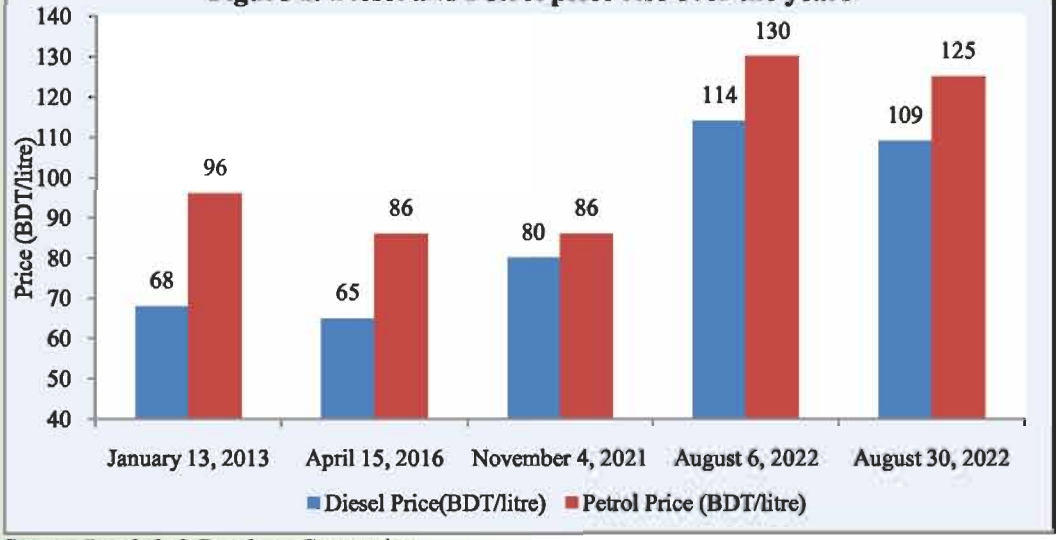
Figure 1 shows the global price of oil from January 2019 to September 2022. In 2019, the global oil price was around 56 US dollars per barrel (USD/barrel) to 64 USD/barrel. The price of world oil has been disruptive since the start of Covid 19 pandemic. There was a downward trend in oil prices in 2020 due to the pandemic. The global oil price reached its lowest point in April 2020, only 21.04 USD/barrel. The economic activity has been slowed down due to lockdown and mobility restrictions during the pandemic's starting time, which created lower demand of oil. So, due to the lower demand for oil globally, world oil prices were relatively low.

However, with the lower cases of Covid 19 at the end of 2020, restrictions have been eased in most countries, and economic activities started to rebound soon. The increase in production across countries also brings in rising demand for petroleum product. Moreover, the global oil supply has experienced an unprecedented supply shortage since the Russian invasion of Ukraine on February 24, 2022. Russia is the second-biggest exporter of oil after Saudi Arabia and the largest exporter of oil to international markets. As a result, increasing demand and supply shortage pushes the price of world oil up. Due to the global fear of geopolitical tensions arising from the Russia-Ukraine war, the world oil price increased immediately after the Russian invasion of Ukraine. It peaked at 116.80 USD/barrel in June 2022. However, the world price has decreased in recent months due to the increasing

production of OPEC countries and other supportive measures taken by the US Federal Reserve System. The petroleum price has a direct impact on the prices of refined oil products and an indirect impact on consumer prices through production costs in Bangladesh. For this, the petroleum prices have been kept administered by the Bangladesh Petroleum Corporation (BPC).

Figure 2 illustrates administered price set by BPC from January 13, 2013 to August 30, 2022. BPC kept domestic oil prices steady from April 2016 to October 2021. However, when economic activities were restored fully after the lockdown due to Covid 19, the world oil price also increased sharply. Following this, in November 2021, BPC increased the prices of kerosene and diesel by 23 percent after five years, from 65 Bangladesh Taka per liter (BDT/liter) to 80 BDT/liter. However, BPC kept the price of petrol unchanged and decreased the price of octane by 3.4 percent.

Figure 2: Diesel and Petrol price rise over the years



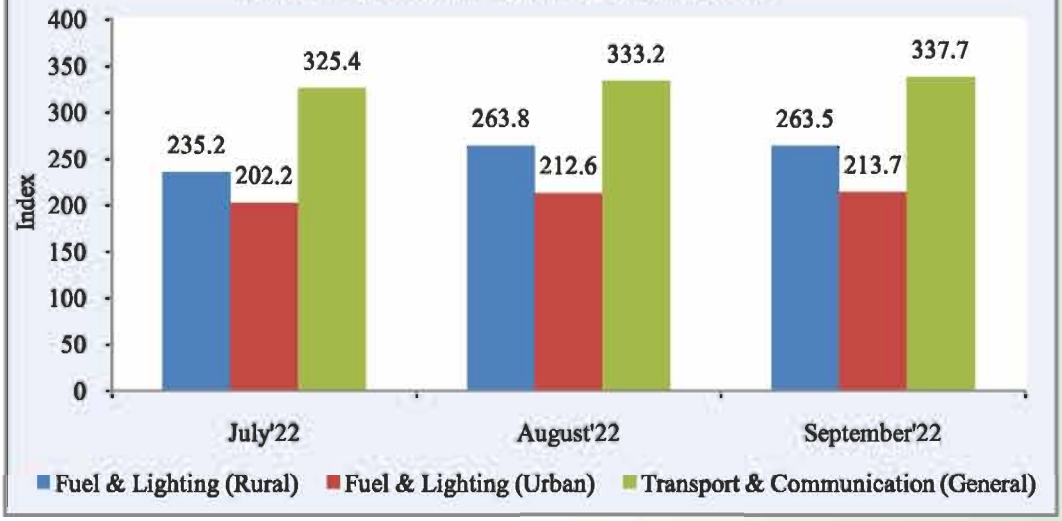
Source: Bangladesh Petroleum Corporation

After starting the Russian-Ukraine war in February, 2022, the global price of oil has been erratic and reached as much as 116.80 USD/barrel in June 2022. However, the BPC did not raise the domestic petroleum prices in Bangladesh during that time. So, it incurred a huge loss in the account of BPC. Despite the decreasing global oil price trend after June 2022, BPC increases domestic oil prices by a huge margin to tackle the loss it faces earlier. On August 6, 2022, BPC hiked diesel and kerosene prices by Tk34 per liter, petrol prices by Tk44 per liter, and octane by Tk46. However, BPC slightly reduced the fuel prices later on August 30, 2022.

3.2. Domestic oil price increase and its impact on consumer prices

Diesel is Bangladesh's most widely used fuel, making up over 73 percent of all fuel usage (BPC, 2022). The recent price increase on various fuels, including diesel, in August 2022 immediately impacts transportation and daily necessities. After BPC raised oil prices in August 2022, the effect of the increase was immediately felt in the fuel, lightning, transportation, and communication sectors of non-food inflation. Bangladesh Road Transport Authority and transport owners have raised bus fares by 22 percent after a record fuel price hike. The effect of rising oil prices in August 2022 on the indexes of transportation and communication index and fuel and lightning is depicted in Figure 3. In rural areas, the fuel and lightning index increased from 232.2 in July 2022 to 263.5 in August 2022. The fuel and lightning index in urban areas increased from 202.2 in July 2022 to 212.6 in August 2022. The Transport and Communication Index rose 2.37 percent from July to August 2022. In September 2022, fuel, lightning, and the Transport and Communication index increased.

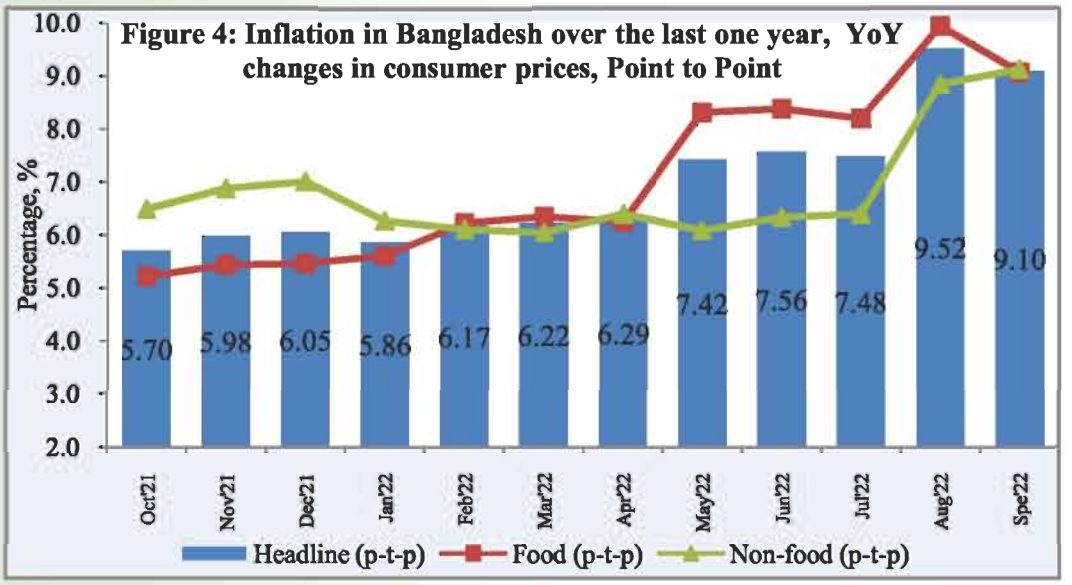
Figure 3: Fuel & Lightning and Transportation & Communication Index in recent months



Source: Bangladesh Bureau of Statistics

The first week of November last year saw the first surge in oil prices. Diesel prices had jumped by 23 percent at the time. However, the current price increase has broken all previous records. People are once more under financial strain as a result of the high cost of living. As a result of the increase in fuel oil prices, almost all essential goods' prices have

increased, and now power prices are expected to increase as well. In addition, there is a huge demand for diesel in agricultural production. So, the cost of agricultural production increased with the oil price increase. As a result, food and non-food prices increased at the consumer level.



Source: Bangladesh Bureau of Statistics

Figure 4 shows the trend of inflation in Bangladesh over the last years, from October 2021 to September 2022. Food and non-food inflation drive the headline point-to-point inflation upward in the last 12 months. Since February, the global markets have plummeted, food costs have gone up, and inflation has spread to every country. However, after the oil price hike in August 2022, Bangladesh saw its highest inflation rate in 135 months, hitting a record high of 9.52 percent in August 2022.

Moreover, in August 2022, point-to-point food and non-food inflation stood at 9.94 percent and 8.85 percent, respectively. According to the BBS statistics, non-food inflation rose to 9.13 percent nationwide in September, with rural areas seeing a higher rate of 9.48 percent and urban areas experiencing a lower rate of 8.66 percent.

4. Data and model specification

This research work is based on secondary data, and these data are collected from different official sources. However, this study utilized the monthly data of inflation rate, domestic oil prices (diesel, petrol and octane), broad money supply (m2), and world oil price. The data of inflation rate is collected from the Bangladesh Bureau of Statistics, and the data of

domestic oil prices at the consumer level is collected from Bangladesh Petroleum Corporation. The world oil price data is collected from World Bank, and the data of broad money supply is collected from Bangladesh Bank. We used monthly data from July 2013 to September 2022 in the estimation process.

4.1. Model of the estimation procedure

In this research, our key variable is inflation, since we want to explore how the recent increase in oil prices may affect the inflation rate in Bangladesh. So, we employed the rate of inflation as a dependent variable and other variables respectively diesel price, world oil price, and m2 (Broad Money Supply) are implied as explanatory variables or independent variables. In this case, the diesel price is used as a proxy for the domestic oil price. In this investigation, the estimating process is done using the VECM model. Additionally, a correlation matrix is also illustrated to point out the connection between inflation, domestic oil prices, and global oil prices.

This analysis followed the functional form of each variable in natural log form except the rate of inflation. Rahaman et al. (2020), using the co-integration method and a VEC model in their research work to investigate the effects of oil price shocks on inflation of Bangladesh. The equation is given below:

Infl_rate = f (ldiep, lwop_usd, lm2)..... (1)

Where, Infl_rate= Rate of inflation;

Ldiep= log of diesel price;

Lwop_usd= log of world oil price;

Lm2= log of Broad money supply;

This study uses a simple vector error correction model to determine the long-run effect of inflation with oil prices. The VECM equation of this analysis is:

$\Delta(infl\_rate)t = \alpha0 + \sum n\ i=0 \alpha i \Delta infl\_rate t-i + \sum n\ i=0\ \beta1 \Delta diept-i + \sum n\ i=0\ \boxtimes 1 \Delta wop\_usdt-i + \sum n\ i=0\ \mu1 \Delta m2t-i + \boxtimes 1\ \emptyset t-1 + \notin t$.....(2)

Øt-1is the ECT and the residual from the following long-run co-integrating regressis:

$\Delta(Infl\_rate)t = \alpha0 + \alpha1 ldiept + \alpha2 lwop\_usdt + \alpha3 lm2t$ ..... (3); and

ECT is defined as,

Øt-1=Error correction termt-1 =Δ(Infl_rate)t-1 - α0 -α1 ldiept-1 - α2lwop_usdt-1 - α 3lm2t-1... (4)

This VECM equation will represent the existing long-run relationship among the variables, and the error correction term shows short-run effects. Here, Δ means the change, t means time, ∉t symbol of error disturbance term, α0 is the intercept, Øt-1is the ECT and α1, α2 and α3 are the coefficient of the exogenous variables.

4.2. Result analysis

Before proceeding toward the VECM model, the correlation among the variables has been checked to understand how well the variables are connected.

Table 1: Correlation matrix

	Inflation	Diesel Price	Petrol Price	Octane Price	World Oil Price
Inflation	1				
Diesel Price	0.682641	1			
Petrol Price	0.785067	0.644933	1		
Octane Price	0.783997	0.657992	0.999639	1	
World Oil Price	0.672311	0.524662	0.310426	0.31	1

Source: Author's calculation

Table-1 shows that the prices of diesel petrol, octane, and world oil are positively correlated with the inflation rate. The correlation between inflation and oil prices indicates that change in oil prices affected the rate of inflation positively. This correlation matrix is also consistent with theory.

To start the estimation of the analysis, at first, we examined the stationary test of the variables because a random time series is assumed to be stationary if its mean and variance are time invariant (Gujarti, 1995).

At first, to determine whether the variables are stationary, we have done ADF test. ADF is the simple and convenient approach to determine stationarity. Philips-Perrron (PP) unit root tests (Philips-Perrron, 1988) have also been used to test stationarity among the variables. However, all variables are stationary in the first difference at the 5% significance level. The results of the unit root test are presented in Table-2.

Table 2: Unit root test

Variables	ADF-test				PP-test			
	At level		At first difference		At level		At first difference	
	t- statistics	p- value	t- statistics	P* - value	Adj.t-statistics	p-value	Adj.t-statistics	P* - value
Infl_rate	-2.189033	0.2115	-7.692796	0.0000	-1.109110	0.7104	-12.32971	0.0000
Ldiep	1.053015	0.9969	-13.95774	0.0001	4.202820	1.0000	-10.49746	0.0000
Lwop_usd	-2.189033	0.2115	-7.692796	0.0000	-2.086879	0.2504	-6.865835	0.0000
Lm2	-2.154658	0.2242	-12.70299	0.0001	-1.932121	0.3166	-13.80531	0.0000

Null hypothesis is no unit root presence and * is for statistically significance.

After testing stationarity among the variables, we select the optimum lag length in the estimation procedure. In this analysis, according to the Akaike information criterion (AIC), sequential modified Likelihood Ratio (LR) test statistic (each test at 5% level), and Final prediction error (FPE) criteria appropriate for choosing the lag length. In these criteria, the optimal lag is 2. The result of optimal lag length is showed in table-7 in appendix.

By utilizing optimal lag length, we found co-integrating equation among the variables. If there exist at least one co-integrating equation, then we can proceed to run the VECM model; otherwise, we have to carry on ARDL model.

In our analysis (Table 3), we used the most convenient co-integration method, the Johansen co-integration test, and we found only one co-integrating equation. Besides, the trace test indicates only 1 co-integrating equation at the 0.05 level, and the Maximum–eigen value test also showed 1 co-integrating equation at the 0.05 level. The results of the Johansen co-integration test indicate the long-run relationship among the variables.

Table 3: Johansen co-integration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.258053	49.34080	47.85613	0.0360
At most 1	0.086688	18.00071	29.79707	0.5660
At most 2	0.059874	8.479580	15.49471	0.4156
At most 3	0.018837	1.996721	3.841465	0.1576

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

4.3. VECM test

VECM model generally indicates the long-run relationship among the variables and its error correction approach shows the short-run adjustment. The following table represented the findings of VECM model:

Table 4: VECM model	
(Dependent Variable is rate of inflation)	
Variables	Co-efficient Value (t-Value)
$Infl\_rate_{t-1}$	1.000000
$Ldiep_{t-1}$	- 48.57099 (-3.40179)***
$Lwop\_usd_{t-1}$	- 2.782393 (-1.23043)***
$Lm2_{t-1}$	- 6.989122(-2.86546)***
C	322.7480

*** is for statistically significance.

On the basis of VECM estimation, the equation can be written as follows:

Infl_ratet-1 =-322.7480+ 48.57099 Ldiept-1+ 2.782393 Lwop_usdt-1+ 6.989122 Lm2 t-1+ ¢t-1

Here, infl_rate= rate of inflation; Ldiep = log of diesel price; lwop_usd = log of world oil price; Lm2 = log of M2; ¢t-1 = error correction term.

The VECM is appropriate in this study to show the long-term effects. This result of VECM indicates that percentage changes in domestic oil prices influence the rate of inflation. In recent times, a 1 percent increase in domestic oil price might covers nearly 50 percent in total inflation rate, which is coherent with the real scenario. This is actually representing the immediate impact of oil price hike. When domestic oil price just increased it may immediately boost inflation rate up. Besides, this result is also statistically significant. This result showed that domestic fuel prices have the huge impact in increasing inflation in Bangladesh's economy, because the oil price is directly and indirectly connected with overall economic sectors. However, a 1 percent increase in the world oil price will increase the inflation rate by 2.78 percent, but the statistical result is insignificant. Again, a 1 percent increase in broad money supply will increase inflation by 6.98 percent, which is also statistically significant.

4.4. The error correction term

ECT coefficient is (-) 0.043820, which is statistically significant. The negative sign of the coefficient indicates the existence of a short-run adjustment mechanism in the pace that brings the long-run relationship back to equilibrium once the system gets out of equilibrium. However, the magnitude of the coefficient indicates that it takes about four years to get back to equilibrium.

Table 5: The error correction term			
Test	coefficient	Standard error	t-statistics
$Ø_{t-1}$	-0.043820	(0.008442)	-5.190438

4.5. Serial Correlation test

Table 6: VAR Residual Serial Correlation LM Tests						
Null hypothesis: No serial correlation at lag h						
Lag	LRE* stat	df	Prob.	Rao F-stat	df	Prob.
1	12.73277	16	0.6922	0.793881	(16, 281.7)	0.6924
2	12.58481	16	0.7028	0.784453	(16, 281.7)	0.7030
3	17.86083	16	0.3321	1.123634	(16, 281.7)	0.3324

From the above table, it is clear that there is no serial correlation in the estimated model. So, the model is free from serial correlation and accepting the null hypothesis.

5. Conclusion and Policy Recommendation

In today's world, inflation is inextricably linked to national prosperity. In this study, the effect of the recent oil price hike on the inflation rate is analyzed by using the VECM. From the outcome of this study, it is clear that domestic oil price hikes have a significant positive long-run relationship with the inflation rate in Bangladesh. The error correction term of the estimation process confirmed that the long-run coefficient has a stable equilibrium. Other than that, the impact of world oil prices has very small positive effects on the inflation rate, but it is statistically insignificant. Moreover, M2 also influences the inflation rate and is statistically significant. In recent times, oil price change has significantly impacted economic growth, commodity demand, government revenue, price stability, and overall

national well-being in Bangladesh. Therefore, timely implementation of policies is necessary for managing inflation due to oil price hikes. With strong governmental measures and careful planning during the oil price surge, it will be easier for the government to keep inflation stable for the general public. The following policy proposals may be taken into account:

- The Bangladesh government recently adjusted the oil price to match the world market and passed on the new price to the general public. As a result, the government may change its tax and subsidy policy on fuel to reduce or control cost-push inflation during oil price hikes.

- The increase in oil prices may impact the economy directly and indirectly by increasing the food and non-food inflation, which may adversely influence economic growth. In this regard, the central bank may declare a proactive policy aimed at controlling the future impact of inflation rather than the current situation due to maintaining its core purpose of price stability and employment generation.

- To attain sustainable economic development, Bangladesh should emphasize using renewable energy, especially for transportation sectors that depend solely on fossil fuel or oil. Thus, as an oil-importing country, slight volatility in oil prices significantly influences the inflation rate. So, the government, researchers, and policymakers should take the initiatives to invest in the innovation and new creation of renewable energy for the transportation sector. The government and central bank might introduce new policies to support innovation and the creation of renewable energy for transportation sectors. As part of policy assistance, the banks and FIs should also launch a new credit facility for renewable energy innovation. Jain and Goswami (2021) suggested using renewable energy facilities is a better strategy.

- BPC should adopt a regulatory policy about adjusting domestic oil prices in line with world oil prices rather than maintaining a strict administered price policy. That means BPC might take policy to fix oil prices according to market demand and supply. It might reduce the sudden hike of inflation due to domestic fuel price rise.

- Diesel is a fundamental element in irrigation and transportation used in the agricultural activities. So, diesel price increase may raise the production cost in the agricultural sector. The government should take the initiative to reconsider and redesign different subsidy-related policies in the agricultural sector to subdue any external shock in oil prices.

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Appendix

Table 7: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	70.57699	NA	3.19e-06	-1.305431	-1.202491	-1.263747
1	788.5540	1365.564	3.35e-12	-15.06969	-14.55499	-14.86127
2	842.3666	98.12887	1.60e-12*	-15.81111	-14.88465*	-15.43595*
3	853.6115	19.62347	1.76e-12	-15.71787	-14.37965	-15.17598
4	861.5026	13.15172	2.08e-12	-15.55887	-13.80889	-14.85025
5	879.6263	28.78481	2.02e-12	-15.60052	-13.43877	-14.72515
6	899.1903	29.53771	1.92e-12	-15.67040	-13.09689	-14.62830
7	923.6249	34.97501*	1.66e-12	-15.83578*	-12.85052	-14.62695
8	936.4807	17.39316	1.83e-12	-15.77413	-12.37711	-14.39856

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion