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Impact of Edible Oil Import on GDP Growth in Bangladesh: A Panel Analysis

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Abstract

Oil is one of the major imported products and an essential factor in the aggregate production function of Bangladesh. The objective of this study is to see the trend of selected 11 edible oils imports and the effect of selected edible oils imports on GDP growth in Bangladesh. The study uses a secondary data of 26 years for the period 1995-2020 obtained from "The Yearbook of Agricultural Statistics", published by the National Statistical Organization (NSO) and Bangladesh Bureau of Statistics (BBS). Descriptive statistics and econometric techniques are used to determine the trends of edible oils imports and to evaluate the effect of edible oils imports on GDP growth in Bangladesh. In descriptive statistics, it is observed that money value for import of selected edible oils and quantity of imported selected edible oils are volatile in the whole study period 1995-2020. Trends of imports of selected edible oils in Bangladesh are sighted overall increasing pattern with irregular fluctuations in the study period but imports of mustard oil has a decreasing trend in the same period. The study also found that the considered data has no serial correlation and non existence of heteroskedasticity. The research work has fitted a fixed effect panel regression model with robust standard error for the considered data. Wald test and Hausman test also conferred to fit the fixed effect panel model. The work shows that the money value for import edible oils and quantity of imported edible oils have a negative relationship with GDP growth in Bangladesh. This might be happened due to continuous increasing the price of USD against BDT that results devaluation of BDT which directly impact on imports.

Key Words: Edible Oil, GDP, Panel Analysis, Hausman Test, Fixed Effect Model.

1. Introduction

Oil is one of the most essential products all over the world and the case of Bangladesh is no exception. According to Statistical Review of World Energy, Bangladesh imports 21% of its oil consumption. Though the home production is doubled at present, it can hardly meet 10% of the country's requirement. Due to change in the international oil prices, the expenditure on oil import has been fluctuating widely. Bangladesh has a strong import relation with 183 countries where they import 4184 items of products with different type of edible oils. Bangladesh imports major portion of oil from Malaysia, Indonesia, and Brazil.

According to Bangladesh Bank, the country spent $8.9 billion on import of oil products in financial year 2021-22, about 67.71% more from $5.3 billion worth import in financial year 2020-21. Most of the international financial entities like the IMF and the World Bank predicted that volatility in prices of commodities would persist throughout the next year. The government is desperately looking for alternative sources, alternative edible oils and taking up trade-related measures to maintain a smooth supply of edible oil in the local markets at affordable prices.

Various key sectors of Bangladesh's economy rely on oil import. These oils are used in many sectors of people's daily life like cooking, medicine, skin care etc. Therefore, the demand for oil import influences economic growth and any volatility in imports is likely to affect the process adversely.

According to Trade Data Monitor (TDM), in the last fiscal year, the United States captured 43% of the market share in soybean exports to Bangladesh, followed by Brazil (36%), Canada (14%) and Uruguay (7%). In 2020-21, an overwhelming 76% of Bangladesh's total soybean oil imports came from Argentina, followed by 13% of

from Paraguay, 9% from Brazil and 2% from others. Some 87% of Bangladesh's over 1.4million tons of palm oil imports were sourced from Indonesia in 2020-21 while the remainder came from Malaysia.

Economists through empirical analysis of different economics have identified that oil price has significant impact on economic growth [Hamilton (1983), Mork (1994), Carlton (2010)]. IEA (International Energy Agency) concludes in its report at 2004 that the impacts are even more severe for developing economics. It is mentioned in report that the reason behind these severe impacts is that use of the energy in developing countries is inefficient. Further net oil-importing developing countries like Bangladesh use oil in double quantity as compared to developed countries to produce a unit of economic output.

1.1 Problem statement

Bangladesh has been foreseeing a supply crunch of edible oil with the proposed export ban as the country sources 85% of its annual requirement of 11 lakh tons of crude palm oil from Indonesia. Bangladesh's annual requirement of edible oil is 20 lakh tons. Demand rises during Ramadan by 2.5 lakh tons to 3 lakh tons because of food habits of people in this month of fasting, according to data from the commerce ministry. Only around 2.03 lakh tons can be provided through local production and the rest of the demand has to be met through imports. The price of edible oil has been fluctuating in the local and international markets over the last two years.

Oil is an essential factor in the aggregate production function of Bangladesh. Thus, any factor that influences oil and oil products has far-reaching consequences on the economic growth and development of the country. In this light, this study sought to examine the effect of oil imports in Bangladesh with a view to finding ways of stabilizing the trend on GDP. The study answered the question: what is the relationship between oil imports and GDP in Bangladesh? Furthermore, this study was intended to investigate the trends of import of selected edible oils and economic performance in Bangladesh.

1.2 Objectives of the study

The main objective of the study is to examine the effect of edible oil import on GDP in Bangladesh. The specific objectives of this study are as follows:

1. To evaluate Bangladesh's economic development and import trends of selected edible oil products.

2. To establish the relationship between selected edible oil imports and economic growth.

3. To determine the effect of importing edible oil on GDP in Bangladesh

1.3 ***Significance of the study***

Oil is one of the major imported products in Bangladesh. The study provided useful information about the effects of oil import on GDP of Bangladesh. In cooking sector, these oils are used at a wide range. This has continued to be the case and oils have continued to be the most important source. In recent times, there has been escalation of oil prices in Bangladesh. Therefore, prices are a very important focus point when dealing with oil and thus policies to address these issues can only be made with knowledge how the selected oil imports are affecting the GDP of Bangladesh. The study also adds to the existing literature and acts as a basis for scholars who will conduct related research in future. It is expected that the government would be benefited from the results of the study by using them to formulate and effectively enforce the fiscal and monetary policies. These aforementioned seasons are therefore justify the importance of this study.

The rest of the article is divided as follows. The next section focuses on review of literature followed by the data and methodology section. The penultimate section is result and discussion. Conclusion and recommendation section end the article.

2. Review of Literature

So far we found a few number of researches have been conducted on edible oil import's effect on GDP of a country but a number of researches is found considering the factors oil price, exchange rate, GDP growth, Government revenue, Government consumption, political risk etc. We discuss some of them in the below.

BANSIM II the extended model has been able to show that the MDG targets in countries like Bangladesh will be seriously derailed by the global oil price increase. To combat such situations and to ensure the MDG targets are achievable the world community must design programs to help the poor people who will miss the bus and cannot get out of poverty for reasons beyond their control (Haque, A. E. , 2007).

The oil market in Kenya is vulnerable to shocks that affect the supply of crude oil since it corrects to its long-run equilibrium at a very slow pace (7.4% per quarter). The only variable that has a significant role on oil import volatility in the short-run is exchange rate (Mureithi A.W., 2014).

According to Oriakhai and Osaze (2013), the oil import demand in a country is affected by several factors, such as international oil prices, domestic energy production, exchange rate fluctuations, political risks in the oil producing countries, GDP growth and interest rates etc.

Krugman (1987) asserted that in the event of currency depreciation in the importing country, the exporter is likely to reduce the prices of his goods and services to make his products affordable in the importing country. This is likely to happen if the exporter is facing a highly elastic demand curve due to high competition.

Metcalf and Wolfarm (2010) found in their study that political stability is one of the major determinants of oil production volatility in OPEC countries. Countries with very democratic political systems had less volatility in oil production than their counterparts with autocratic political systems. Fluctuations in oil production are found to affect global oil prices, thereby causing price volatility in countries that import oil. In addition, the level of oil consumption and the size of economy determined oil import volatility.

Narayan (2013) examined whether oil prices can play role in forecasting the exchange rate returns in 14 Asian countries with a different exchange rate regime. He shows that the Vietnamese Dong experiences future depreciation due to the increased oil price. On the other hand, the scenario is quite the opposite in Bangladesh, Cambodia and Hong Kong; higher oil prices result in future appreciation in these regions.

Yazdani and Faaltofighi (2013) analyzed the causal relationships between oil import and economic growth in five oil-importing countries, namely, Turkey, South Korea, Malaysia, India and Pakistan. Their data set included oil import and GDP growth rate for each country for the period 1980 to 2007. The economic technique used in this study was the panel fully modified ordinary least squares (PFMOLS) and the panel error correction model. They found a unidirectional causal relationship running from GDP to oil imports, implying that variations in oil imports is a direct response to fluctuations in GDP growth.

Gbatu *et al*. (2017) focused on a low-income country and examined the impact of oil price shocks on Liberia using the ARDL Bounds test. They found an asymmetric relationship between oil price and growth. Moreover, the impact of oil price was found to be limited to the short run. They also found that there was no positive impact on GDP growth in the short run during periods of decreasing oil prices. Unlike traditional studies, falling oil prices do not translate into more production inputs in developing countries. Rather, it increases savings and opportunity for corruption. However, the increase in oil prices stimulated the Liberian economy during the period examined.

Regarding cross-country studies, Cunado and Perez-de Gracia (2003) analysed 14 European countries using quarterly data from 1960 to 1999 and applying a VAR technique. They found a direct relationship between oil price and GDP for half of the countries, but no direct relationship for the other half. They explained that choosing either world oil prices or a national real oil price index influence the difference between oil prices and outputs. They also found that only the United Kingdom and Ireland exert long-run relationships between oil prices and outputs. Therefore, the effect of oil price shocks on economic growth is restricted to the short-run.

Lee and Ratti (1995) used a GARCH model in order to extract conditional variance from real oil price changes. They concluded that positive oil price shocks are significantly negatively correlated with real GNP growth, but negative oil price shocks are not.

Anshasy *et al*. (2005) examined the effects of oil price shocks on Venezuela's economic performance over 1950 to 2001. They investigated the relationship between oil prices, governmental revenues, government consumption spending, GDP and investment by employing a general to specific modeling (VAR and VECM). They found two long run relations consistent with economic growth and fiscal balance. Furthermore, they found that this relationship is important not only for the long run performance but also for short-term fluctuations.

Olomola and Adejumo (2006) examined the effects of oil price shocks on output, inflation, real exchange rate and money supply in Nigeria using quarterly data from 1970 to 2003. Using VAR methodology they found that oil price shocks do not have any substantial effect on output and inflation. Oil price shocks significantly determine the real exchange rate and significantly affect the money supply in the long run. Olomola and Adejumo conclude that this may squeeze the tradable sector, giving rise to the Dutch disease.

3. Data and Methodology

3.1. Data

This study uses secondary data of 26 years for the period 1995-2020 obtained from "The Yearbook of Agricultural Statistics", published by the National Statistical Organization (NSO) and Bangladesh Bureau of Statistics (BBS). We have extracted Gross Domestic Product (GDP) of Bangladesh, money value (in thousand BDT) for import and quantity (in thousand tons) of imported of 11 selected edible oils. The 11 selected edible oils are castor oil, coconut oil, vegetable oil, Animal/vegetable fat oil, Mustard oil, Olive oil-fraction, Olive oil-virgin, Soybean oil, Groundnut oil, Palm oil and Babassu oil. The research work is considered GDP as explained variable and other two (money value for edible oil import and quantity of edible oil import) as explanatory variables. Thus the data set become a panel data.

3.2 Methodology

The descriptive analysis is used to provide basic information about the variables and to highlight the relationships between selected imported oils and GDP over time (1995-2020) in Bangladesh. Panel analysis is used to examine the effect of oil import on GDP in Bangladesh. Keeping the objectives in the mind, we applied the following methodologies as follows: Before conducting the panel analysis, we perform various econometric tests: Variance Inflation Factor (VIF) for multicolinearity, Breusch-Pegan test for heteroskedasticity, Skewness-Kurtosis test and JB statistic for normality, Wald test and Hausman test to select the appropriate panel model to be fitted.

Considered panel data regression model as follows:

$$y_t = \alpha + \beta_1 x_{1t} + \beta_2 x_{2t} + u_t$$

where,

y = GDP

x_{1t} = *money value for imported edible oil at time t*

x_{2t} = *quantity of imported edible oil at time t*

In this study Microsoft Excel and Statistical software STATA are used.

4. Results and Discussion

4.1 Descriptive Statistics

Table 1: Summary statistics of quantity (in thousand tons) of imported some selected edible oils.

Edible oils	Mean	Standard deviation	Skewnesss	Kurtosis	Maximum value	Minimum value
Castor oil	216279.62	673026.47	4.93	24.78	3481182	4539
Coconut oil	3403501	3268950	1.80	3.92	14183626	1247
Vegetable oil	3854616	4928568	1.16	0.13	15241059	308
Animal/vegetable fat oil	340937.2	331908.6	1.35	1.70	1213255	562
Mustard oil	17312804	26683428	1.49	1.15	101000000	76
Olive oil, fraction	324881.6	662278.4	4.51	21.78	3447740	76
Olive oil, virgin	152423.6	255865	3.84	16.67	1290123	2368
Soybean oil	417824355.6	655173307.8	1.27	0.08	1935064747	528
Groundnut oil	125260.9	489970.1	5.08	25.87	2524797	2502
Palm oil	1050036212	864265892.8	0.60	-0.41	2993117641	6637633
Babassu oil	2345560	2038558	0.72	0.55	7917445	19

Table 2: Summary statistics of money value (in thousand BDT) for imported of selected edible oils.

Edible oils	Mean	Standard deviation	Skewnesss	Kurtosis	Maximum value	Minimum value
Castor oil	428.86	998.94	4.38	20.73	5089.06	3.68
Coconut oil	2728.41	2184.19	1.23	1.88	9185.33	1.7
Vegetable oil	4027.53	5467.32	1.27	0.40	17531.27	0.06
Animal/vegetable fat oil	255.73	262.47	1.77	3.80	1131.62	4.19
Mustard oil	8798.99	7181.89	1.77	5.17	34117.87	0.09
Olive oil, fraction	330.39	325.99	0.89	-0.05	1145.4	0.07
Olive oil, virgin	356.97	711.84	3.85	16.53	3515.12	2.31
Soybean oil	304607.9	442710.6	0.98	-0.80	1144904	0.54
Groundnut oil	53.99	34.87	0.40	-0.81	128.19	2.12
Palm oil	524379.1	564598.3	0.83	-0.54	1835796	8277.5
Babassu oil	2179.72	2375.31	0.78	-0.93	6651.68	3.02

The descriptive statistics of the quantity of imported oils are presented in the Table 1. There were total 26 observations for each of the imported edible oil. From Table 1 is seen that all types of edible oils have higher standard deviation which imply the volatility of quantity imported of edible oils in study period.

Some descriptive statistics of money values for edible oil import are presented in the above Table 2. From Table 2 it is observed that all the selected edible oils have higher standard deviation indicating the volatility of money values for import of edible oils in study period.

4.2. Graphical Presentation

Trends of GDP and import of 11 selected edible oils in Bangladesh are shown in Figure 1. From Figure 1, it is observed that GDP in Bangladesh has an increasing trend over the study period 1995-2020. It is also sighted that imports of all selected edible oils have overall increasing trend with irregular fluctuations in the study period. On the other hand the import of mustard oil has shown a decreasing trend in the same period.

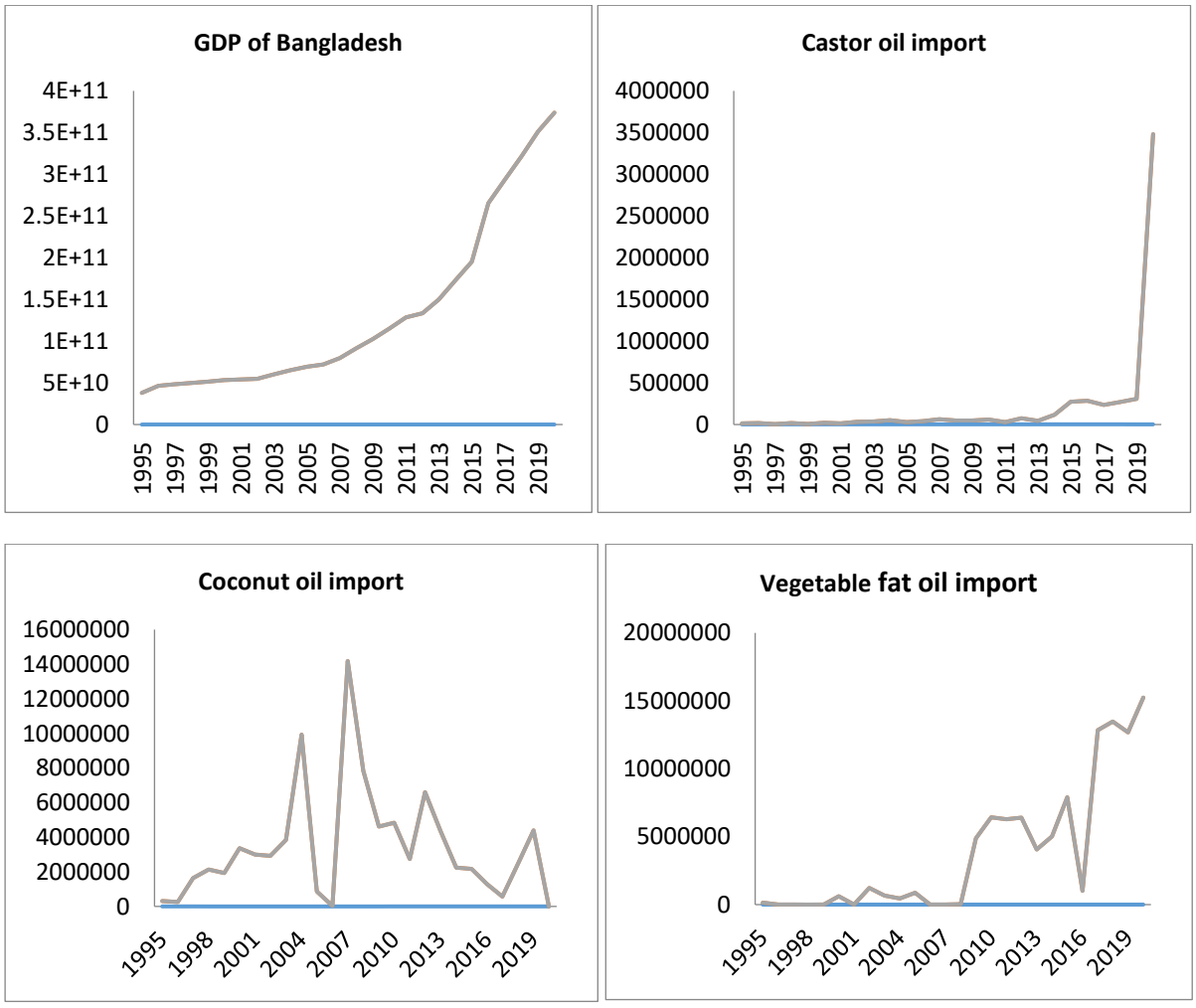

Figure 1: Trends of GDP growth and imports of 11 selected edible oils in Bangladesh.

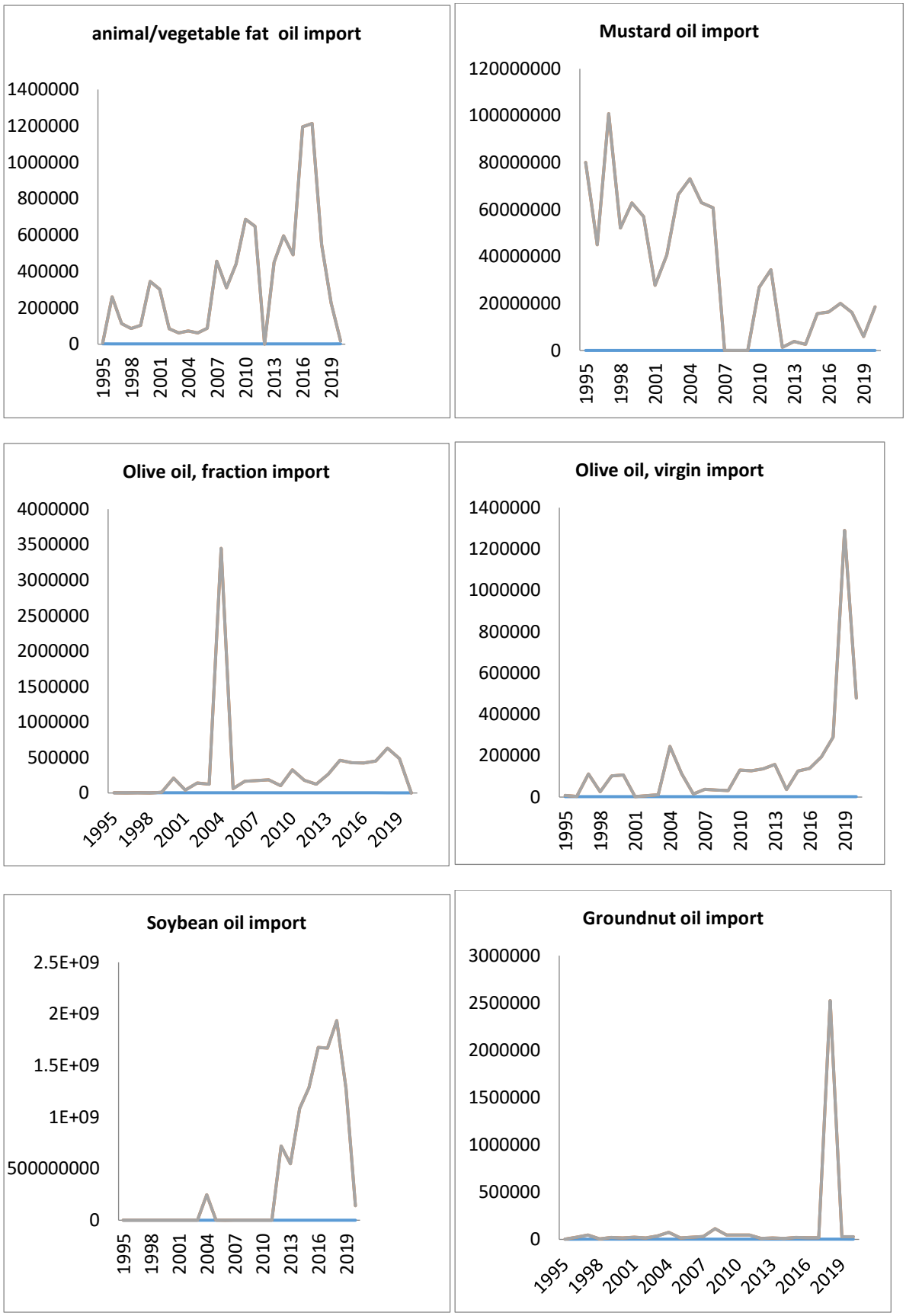

Figure 1: Trends of GDP growth and imports of 11 selected edible oils in Bangladesh. (Continued..)

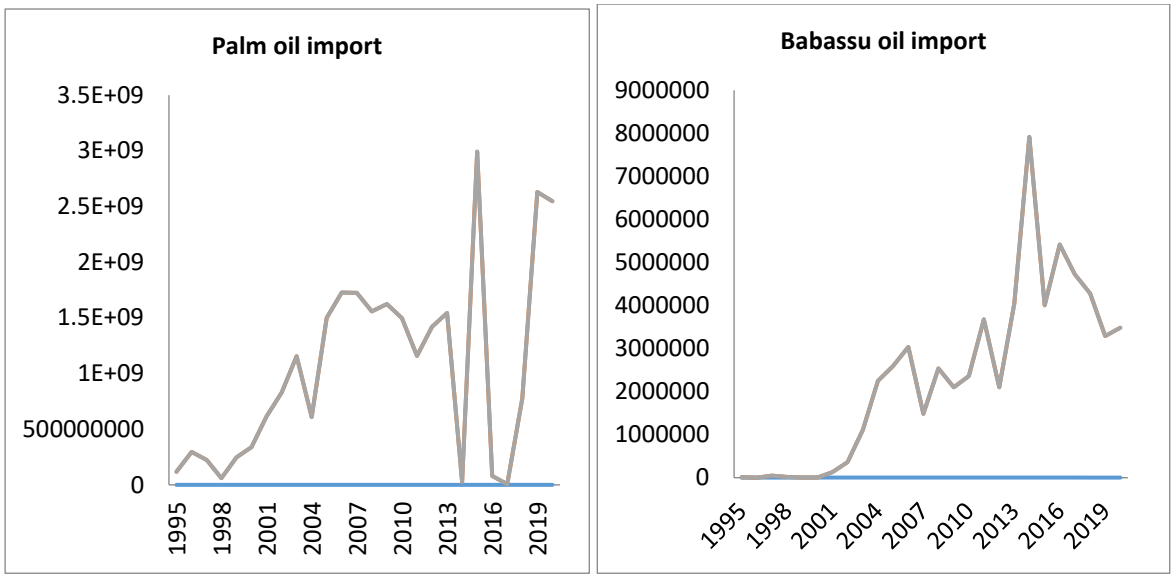

Figure 1: Trends of GDP growth and imports of 11 selected edible oils in Bangladesh. (Continued..)

4.3. Panel Analysis

We have performed a Skewess/Kutosis tests for normality for the data and found that its distribution is approximately normal.

Cook-Weisberg test of heteroskedasticity in the data set is conducted and found the valued of statistic is 0.09 with p=0.7592 which is not significant. The insignificant Cook-Weisberg test statistic advocates that the data are free from heteroskedasticity.

Variance inflation factors (VIF) are calculated for each independent variable and presented in Table 3. The VIFs for all independent variables are found very low (i.e. less than 5) indicate that there is no multicollinearity exist among the independent variables.

Table 3 : Variance Inflating Factor (VIF) for independent variables.

Variable	VIF	1/VIF
quantityinkg	3.85	0.259760
value000	3.85	0.259760
Mean VIF	3.85	

We also have conducted Wald test to select the appropriate model to be fitted for our panel data. The Wald test statistic value is 1.22 with p value 0.2808 which is not significant. This insignificant test statistic indicates that that Pooled OLS model is better than least square dummy variable model. Further a Hausman test is performed to choose a more appropriate model to fit finally for this panel time series data and its result is shown in Table 4. The Hausman test statistic found statistically significant which suggests that a fixed effect panel regression model is suitable to be fitted. Finally we have fitted a fixed effect panel model for our considered data and the results are presented in Table 5.

Table 4: Stata result of Hausman test

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------------------------------------------------------------------------------
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random       Difference          S.E.
-------------+----------------------------------------------------------------
    value000 |    164949.6     156039.3        8910.253        9617.114
quantityinkg |   -14.08284    -44.84336        30.76053        13.45436
------------------------------------------------------------------------------
b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
               =        8.07
Prob>chi2 =      0.0177
------------------------------------------------------------------------------
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Tabel 5: Stata out of Fixed Effect Panel Model.

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------------------------------------------------------------------------------
Fixed-effects (within) regression               Number of obs      =       286
Group variable: itemcode                        Number of groups   =        11
R-sq:  within  = 0.0965                         Obs per group: min =        26
between = 0.0206                                               avg =      26.0
overall = 0.0631                                               max =        26
                                                F(2,273)           =     14.59
corr(u_i, Xb)  = -0.5887                        Prob> F            =    0.0000
------------------------------------------------------------------------------
gdpus |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    value000 |  -164949.6   43629.81     3.78   0.000    -79055.93    250843.2
quantityinkg |  -14.08284     29.031    -0.49   0.628    -71.23593    43.07026
       _cons |   1.21e+11   6.38e+09    19.02   0.000     1.09e+11    1.34e+11
-------------+----------------------------------------------------------------
sigma_u|  2.418e+10
sigma_e|  9.908e+10
rho |  .05618588   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(10, 273) =     0.82             Prob> F = 0.6103
------------------------------------------------------------------------------
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From the results of fitted fixed effect panel model in Table 5, it is observed that both the explanatory variables, money value for import edible oil and quantity of imported edible oil, have negative impact on the GDP in Bangladesh. This implies that with the increase of money value for imported edible oil and quantity imported of edible oil in Bangladesh, its GDP is decreased and vice-versa. The estimate of money value for imported edible oil is statistically significant but quantity imported edible oil in not statistically significant.

5. Conclusion

The objective of the study is to see the trend of some selected edible oils import and the effect of these oils import on GDP growth in Bangladesh. Descriptive statistics and econometric techniques are used to determine the trends of selected edible oils imports and to evaluate the effect of these edible oils imports on GDP growth in Bangladesh. In descriptive statistics, it is observed that money value for import edible oils and quantity of imported edible oils are volatile in the whole study period 1995-2020. Trends of imports of selected edible oils in Bangladesh are sighted overall increasing pattern with irregular fluctuations in the study period but imports of mustard oil has a decreasing trend in the same period. The study found that the considered data has no serial correlation and non existence of heteroskedasticity. The study has fitted a fixed effect panel regression model with robust standard error for the considered data. Wald test and Hausman test also conferred to fit the fixed effect panel model. The research work shows that the money value for import edible oils and quantity of imported edible oils have a negative relationship with GDP growth in Bangladesh. This might be happened due to continuous increasing the price of USD against BDT that results devaluation of BDT which has direct impact on imports. The estimate of money value for imported edible oil is statistically significant but quantity imported edible oil in not statistically significant. The model stability are used and confirmed that the regression results are valid and robust.

6. Recommendations

Considering the results discussed in the foregoing paragraphs, the following recommendations should be considered to stabilize oil import.

First, the government should increase domestic production of edible oil in order to reduce its reliant on imported oil. In addition, oil production plants should be exploited to meet the country's oil demand. Generally, increased domestic production is likely to reduce oil imports, thereby promoting economic growth through a stable and cheap oil supply.

Then, the government should take suitable measure to counter the negative effect of international oil prices by negotiating bilateral trade agreements with major oil producing countries. This will enable the country to access supply of oil at affordable prices.

This study can be extended in future by analyzing the determinants of oil import using a different methodology of econometric framework. Future studies can also include more variables to shed more light on the factors that determine oil import effect on economic growth in Bangladesh.

7. Limitations

The study is not beyond the limitations and these are mentioned below:

1. The analysis has been limited to only 26 years (1995-2020) data due to unavailability of data.
2. Our response variable GDP may depends on many factors but this study is considered only tow explanatory variables.
3. We only consider eleven types of oil, but other oils import have an impact on GDP.
4. The study may not be free from model specification error.

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