EFFECTS OF THE PRICE OF FUEL ON ECONOMIC GROWTH: PERUVIAN CASE, 2010 - 2022

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RESUMEN: Objetivo: Explicar los efectos del precio del combustible en el crecimiento económico en el Perú, período 2010 - 2022. **Material y método:** Se presenta un esquema de corte cuantitativo, no experimental, diseño longitudinal, de carácter explicativo, abarca un total de 150 observaciones provenientes de fuente primaria de las estadísticas de la autoridad monetaria en el país. **Resultados:** El modelo econométrico explica que el precio del combustible gasohol de 84, 90, 95, 97 octanos, gas doméstico, petróleo diesel y GLP vehicular tiene un efecto significativo en el crecimiento económico, según el ajuste R cuadrado, la estimación del modelo es robusto y teóricamente coherente al 5% de nivel de significancia. **Conclusiones:** Los precios de combustibles merecen especial atención para el bienestar de la economía, tienen impacto significativo en el crecimiento económico.

PALABRAS-CLAVE: Gasohol, gas doméstico, petróleo diesel, crecimiento económico, precio del combustible regresión lineal.

ABSTRACT: Objective: Explain the effects of the price of fuel on economic growth in Peru, period 2010 - 2022. **Material and method**: A quantitative, non-experimental cut scheme, longitudinal design, of an explanatory nature, covers a total of 150 observations. from the primary source of the statistics of the monetary authority in the country. **Results:** The econometric model explains that the price of gasohol fuel with 84, 90, 95, 97 octane, domestic gas, diesel oil and vehicular LPG has a significant effect on economic growth, according to the R square adjustment, the model estimate is robust and theoretically consistent at the 5% significance level. **Conclusions:** Fuel prices deserve special attention for the well-being of the economy, they have a significant impact on economic growth.

KEYWORDS: Gasohol, domestic gas, diesel oil, economic growth, fuel price linear regression.

INTRODUCTION

In the world economy there have been changing events in the last three years (Panzera and Postiglione, 2022), the pandemic in 2020, the drop in Russian oil production, the war in Ukraine, the reduction in crude oil, the rise of diesel and gasoline stocks, presented variations in fuel prices (Supervisory Agency for Energy and Mining Investment [OSINERGMIN], 2021; International Monetary Fund [IMF], 2022). Thus affecting the growth of the Peruvian economy with lower growth and bankruptcies due to the health crisis (Central Reserve Bank of Peru [BCRP], 2022).

The international increase in the price of fuels had an impact on the prices of the Peruvian economy, inflation was above the 3% range with increases in the price of food (BCRP, 2021; Cornejo and Florian, 2022). According to Gallardo et al. (2005) and Jiménez (2010), the price of fuel has effects on economic aggregates, the well-being of the population (macroeconomic effect) and on the production costs of companies (microeconomic effect). Fuels have low substitutability, the central bank faces variations in this product (Castillo et al., 2020). The price of fuels from the beginning of 2022 increased notably, for the same reason that it is imported and the internal supply does not cover the national demand.

The content of the article presents five sections: introduction, followed by the approach of materials and methods, development of the results, discussion and finally, the conclusions.

MATERIALS AND METHODS

The study is based on the quantitative, non-experimental, longitudinal, explanatory research design, deductive method, linear regression econometric method (Gujarati and Porter, 2010), population and sample collects 150 observations from January 2010 to July 2022 for the variable economic growth and fuel price from the Central Reserve Bank of Peru (BCRP, 2022). The data is taken from the real indices of the price of gasohol fuel of 84, 90, 95, 97 octane, domestic gas, diesel oil and vehicular LPG (BCRP, 2022).

RESULTS

The estimation of the econometric model with the linear regression on the implication of the price of gasohol fuel of 84, 90, 95 and 97 octane in the economic growth of Peru, with the following statistics (table 1):

a. Significance of F-test. - It is less than 0.05, it is statistically significant, it shows that the model is robust to explain the economic growth variable.

b. r squared. - It is 0.84, it reveals that the model is explained by 84% by the varia-ble price of the 84 octane gasohol fuel.

c.   Significance of t-test. - The 84 octane gasohol fuel price variable is less than 0.05, is highly significant and is related to economic growth.

d.   Beta coefficient. - The positive sign of the sales coefficient of 0.13 indicates that if there were changes in the gasohol fuel price variable of 84, 90, 95, and 97 octane then it will affect economic growth.

Dependent Variable: Economic growth

Method: Least Squares

Included observations: 150 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.575791	4.757184	-1.802703	0.0735
Fuel price G84	0.131814	0.048674	2.708101	0.0076

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.570373	4.293995	-1.995897	0.0478
Fuel price G90	0.135173	0.044966	3.006132	0.0031

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.915955	4.313316	-1.835236	0.0685
Fuel price G95	0.133512	0.047031	2.838790	0.0052

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.644930	4.429664	-1.725849	0.0865
Fuel price G97	0.129310	0.047884	2.700491	0.0077

Note: Run on Eviews V.12.

Table 1

Econometric estimate of the price of gasohol fuel of 84, 90, 95 and 97 octane in the economic growth of Peru: 2010-2022

Next, the regression model on the implication of the price of domestic gas fuel in the economic growth of Peru is estimated, with the following statistics (table 2):

a. Significance of F-test. - It is less than 0.05, it is statistically significant, it shows that the model is robust to explain the economic growth variable.

b. r squared. - It is 0.88, it reveals that the model is explained by 88% by the domestic gas fuel price variable.

c. Significance of t-test. - The domestic gas fuel price variable is less than 0.05, is highly significant and is related to economic growth.

d. Beta coefficient. - The positive sign of the sales coefficient of 0.30 indicates that if there are changes in the domestic gas fuel price variable then it will affect economic growth.

Dependent Variable: Economic growth

Method: Least Squares

Included observations: 150 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.275114	4.327442	-1.450075	0.1492
Domestic gas fuel price	0.108991	0.044569	2.445471	0.0156

Note: Run on Eviews V.12.

Table 2

Econometric estimation of the price of domestic gas fuel in the economic growth of Peru: 2010-2022

Regarding the econometric estimation of the implication of the price of diesel oil fuel in the economic growth of Peru, the following statistics were obtained (table 3):

a. Significance of F-test. - It is less than 0.05, it is statistically significant, it shows that the model is robust to explain the economic growth variable.

b. r squared. - It is 0.83, it reveals that the model is explained by 83% by the diesel oil fuel price variable.

c. Significance of t-test. - The diesel oil fuel price variable is less than 0.05, is highly significant and is related to economic growth.

d. Beta coefficient. - The positive sign of the sales coefficient of 0.10 indicates that if there were changes in the diesel oil fuel price variable then it will affect economic growth.

Dependent Variable: Economic growth

Method: Least Squares

Included observations: 150 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-6.275114	4.327442	-1.450075	0.1492
Diesel oil fuel price	0.108991	0.044569	2.445471	0.0156

Note: Run on Eviews V.12.

Table 3

Econometric estimate of the price of diesel oil fuel in the economic growth of Peru: 2010-2022

The estimation of the implication model of the price of vehicular LPG fuel in the economic growth of Peru, shows the following statistics (table 4):

a. Significance of F-test. - It is less than 0.05, it is statistically significant, it shows that the model is robust to explain the economic growth variable.

b. r squared. - It is 0.81, it reveals that the model is explained by 81% by the vehicular LPG fuel price variable.

c. Significance of t-test. - The vehicular LPG fuel price variable is less than 0.05, is highly significant and is related to economic growth.

d. Beta coefficient. - The positive sign of the sales coefficient of 0.19 indicates that if there are changes in the vehicular LPG fuel price variable, then it will affect economic growth.

Dependent Variable: Economic growth				
Method: Least Squares				
Included observations: 150 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-14.10060	4.610788	-3.058177	0.0026
Vehicle LPG fuel price	0.199368	0.049768	4.005970	0.0001

Note: Run on Eviews V.12.

Table 4

Econometric estimate of the price of vehicular LPG fuel in the economic growth of Peru: 2010-2022

Figures 1 and 2 compare the behavior of the price of gasohol fuel of 84, 90, 95, 97 octane, domestic gas, diesel oil and vehicular LPG.
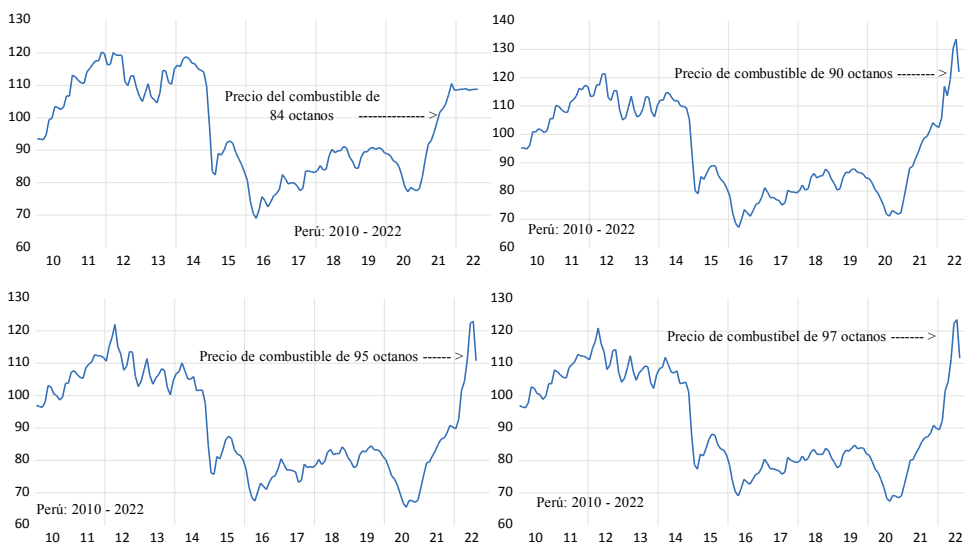

Figure 1. Gasohol fuel price 84, 90, 95 and 97 octane, Peru: 2010 – 2022

(Real fuel price index, 2010 = 100)

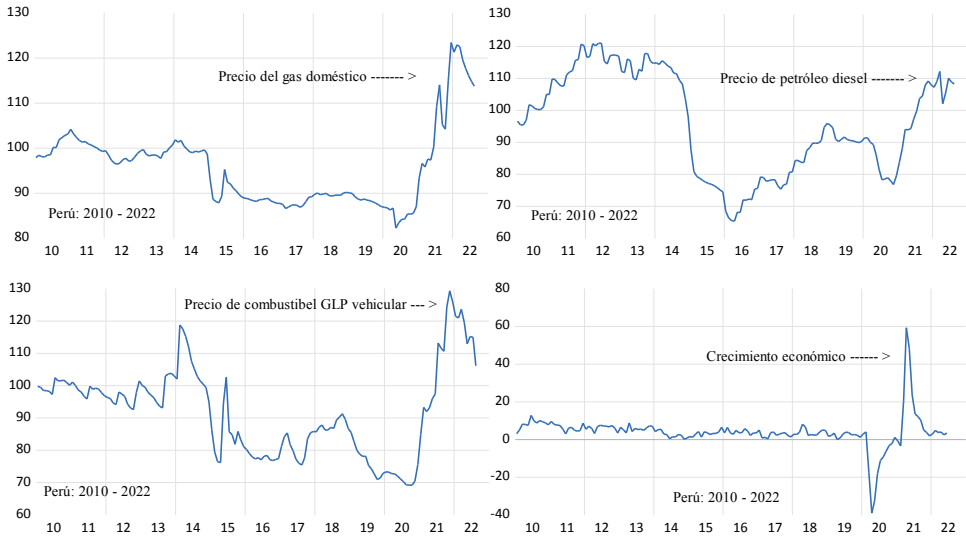Source: Estimated in the EVIEWS program.

Figure 2. Price of domestic gas, diesel oil, LPG fuel and economic growth

Source: Estimated in the EVIEWS program.

DISCUSSION

The price of fuel is variable, depending on international or national events (Parkin, 2007; Samuelson and Nordhaus, 2015), such as what happened in 2022, the armed conflict between Russia and Ukraine, affected the rise in fuel prices worldwide. This situation produced an increase in the price of oil, also causing an increase in the price of food (Gestión, 2022).

Castillo et al. (2022) argue that increases in production costs reduce the gross domestic product, affecting the economy. The findings obtained in the econometric estimation argue at the 5% level of significance the existence of a relationship between the price of fuels and economic growth (Gallardo et al., 2005).

Peru is a country that depends on the international oil market, the low production leads to imports for refining and distribution (República, 2022). The increase in the price of fuels at the international level affected the economic activities of our country, raising the cost of the supply chain due to the use of transportation. Figure 3 presents the parallel behavior that causes the rise or fall in the price of fuels in economic growth.
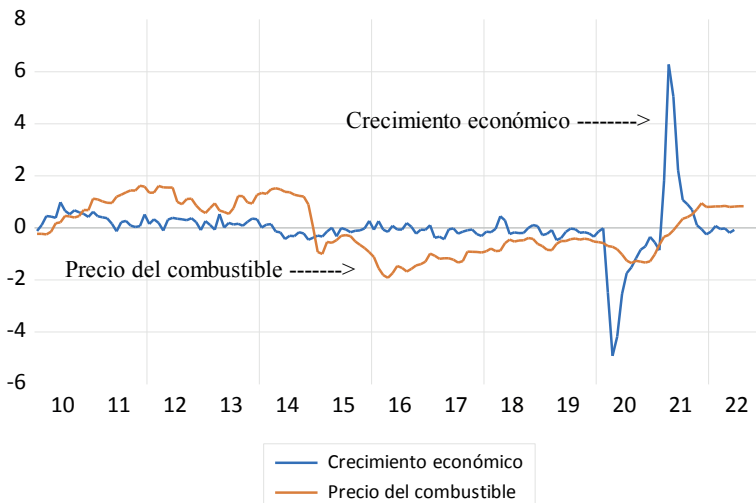
Figure 3. Economic growth and the price of fuel, Peru: 2010 – 2022 (Percentage variations)

Note: Run on Eviews V.12.

CONCLUSIONS

The linear regression model reveals at 5% significance that the price of gasohol fuel of 84, 90, 95 and 97, domestic gas, diesel oil and vehicular LPG have a significant implication on the economic growth of Peru, through the significance F- test, R square, significance of t-test and beta coefficient.

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