ECREG STUDIES
Vol. 18, No. 1, 2025
www.ers.edu.pl
PDF OPEN ACCESS
eISSN 2451-182X

https://sciendo.com/journal/ERS

ECONOMIC AND REGIONAL STUDIES
STUDIA EKONOMICZNE I REGIONALNE

ISSN 2083-3725 Volume 18, No. 1, 2025

IMPACT OF FUEL SUBSIDIES ON ECONOMIC GROWTH IN ENERGY-EXPORTING COUNTRIES – ANALYSIS WITH PANEL DATA

WPŁYW SUBSYDIÓW PALIWOWYCH NA WZROST GOSPODARCZY W KRAJACH EKSPORTUJĄCYCH ENERGIĘ – ANALIZA DANYCH PANELOWYCH

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A. Study design/
Zaplanowanie badań
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Zebranie danych
C. Statistical analysis/
Analiza statystyczna
D. Data interpretation/
Interpretacja danych/
E. Manuscript preparation/
Przygotowanie tekstu
F. Literature search/
Opracowanie piśmiennictwa
G. Funds collection/
Pozyskanie funduszy

ORIGINAL ARTICLE

JEL code: C23, O47, Q40, H71
Submitted: February 2025
Accepted: February 2025

Tables: 4
Figures: 0
References: 37

ORYGINALNY ARTYKUŁ NAUKOWY

Klasyfikacja JEL: C23, O47, Q40, H71
Zgłoszony: luty 2025
Zaakceptowany: luty 2025

Tabele: 4
Rysunki: 0
Literatura: 37

Citation: Laissouf, S., Lahouel, K. (2025). Impact of fuel subsidies on economic growth in energy-exporting countries: analysis with panel data / Wpływ subsydiów paliwowych na wzrost gospodarczy w krajach eksportujących energię: Analiza danych panelowych. *Economic and Regional Studies,18*(1), 36-46. https://doi.org/10.2478/ers-2025-0003

Abstract

Subject and purpose of work: This study aims to measure the impact of fuel subsidy on economic growth in 2010-2020.

Materials and methods: The panel model was used in the study to calculate the variables of fuel subsidies as a percentage of GDP and annual GDP growth per person for 11 energy producers and exporters.

Results: the study showed that fuel subsidies had a significant adverse effect on economic growth, with a 1% increase in fuel subsidies leading to a 0.19% drop in growth in the sample nations.

Conclusions: The findings are consistent with previous studies results and support the view that the policy of fuel subsidies hurts economic growth channels. This study attempted to measure fuel subsidies using the price GAP approach, which allows for estimating the levels of internal energy prices and specific reference prices, such as international energy prices or the price of production cost recovery.

Keywords: economic growth, Panel data, fuel subsidy, energy-exporting countries

Streszczenie

Przedmiot i cel pracy: Celem pracy jest zbadanie wpływu subsydiowania paliw na wzrost gospodarczy w latach 2010-2020.

Materiały i metody: W badaniu wykorzystano model panelowy do obliczenia zmiennych subsydiów paliwowych jako procentu PKB i rocznego wzrostu PKB na osobę dla 11 producentów i eksporterów energii.

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Journal included in: AgEcon Search; AGRO; Arianta; Baidu Scholar; BazEkon; Cabell's Journalytics; CABI; CNKI Scholar; CNPIEC – cnpLINKer; Dimensions; DOAJ; EBSCO; ERIH PLUS; ExLibris; Google Scholar; Index Copernicus International; J-Gate; JournalTOCs; KESLI-NDSL; MIAR; MyScienceWork;Naver Academic; Naviga (Softweco); Polish Ministry of Science and Higher Education; QOAM; ReadCube, Research Papers in Economics (RePEc);SCILIT; Scite; Semantic Scholar; Sherpa/RoMEO; TDNet; Ulrich's Periodicals Directory/ulrichsweb; WanFang Data; WorldCat (OCLC); X-MOL.

Wyniki: Badanie wykazało, że subsydia paliwowe miały znaczący negatywny wpływ na wzrost gospodarczy, przy czym wzrost subsydiów paliwowych o 1% prowadził do spadku wzrostu o 0,19% w krajach objętych próbą.

Wnioski: Wyniki są spójne z wynikami poprzednich badań i potwierdzają pogląd, że polityka subsydiów paliwowych szkodzi kanałom wzrostu gospodarczego. W niniejszym badaniu podjęto próbę pomiaru subsydiów paliwowych przy użyciu podejścia GAP cenowego, które pozwala na oszacowanie poziomów wewnętrznych cen energii i określonych cen referencyjnych, takich jak międzynarodowe ceny energii lub cena zwrotu kosztów produkcji.

Słowa kluczowe: wzrost gospodarczy, dane panelowe, subsydia paliwowe, kraje eksportujące energię

Introduction

Supporting energy products is diverse and widespread (McCulloch, 2021). It is one of the most widespread fiscal policy instruments aimed at protecting low-income families and promoting local industrial growth, especially in the light of the low efficiency of social welfare systems (El-Katiri, 2017). Its estimates vary greatly in size, energy type, end-use sectors, and user countries. This difference is largely due to the definitions and approaches used and the period under study (Sovacool, 2017). In 2017, Slovacool summarized the methods of measuring this support in four approaches: the price gap approach, externalities, the inventory approach, program specific estimation approach. Slovacool has concluded in his study that each approach has strengths and has several limitations affecting its effectiveness (Sovacool, 2017).

Moreover, many international organizations, such as the International Energy Agency, the Organization for Economic Cooperation and Development, and the International Monetary Fund, track global support for consumers and producers (World energy outlook, 2013) (Bárány, 2015, McCulloch, 2017). In this context, fuel is one of the most vital products that countries are interested in supporting and according to data from the International Energy Agency, the financial cost of its support was estimated at $ 187 billion for the year 2021 (IEA, 2021). The International Monetary Fund (IMF) also contributed data on the magnitude of consumption-related external factors in estimating "post-tax" support. Some external factors (e.g. global warming, air pollution from fossil fuel combustion of vehicles, traffic, traffic accidents) are the cost of formal damage that should have been recorded in fuel prices (Coady, 2017) (Coady, 2019). In this regard, the International Monetary Fund presented in 2021 its estimates of the volume of energy subsidies at the global and regional levels by providing a comprehensive image of the broad concept of pre-tax and post-tax energy subsidies for more than 191 countries, amounting to ($ 5.9 trillion), or 6.8% of global GDP in 2020. This increase is due to higher growth in energy consumption with environmental damage such as fuel and coal (Parry, 2021).

This large annual volume of support was considered by Mcculloch in 2017 to be one of the world's biggest economic distortions (McCulloch, 2017), making many economists interested in this area, and various international calling for the need to reform them and to increase their efficiency for economic and social considerations (Rive, 2021). According to Del Granado, (2012), the fuel subsidy policy involves a great deal of social injustice, a poorly designed mechanism to ensure that low-income and poor people have access to energy resources, especially in developing countries Davis, (2014). proved that this issue creates adverse effects on public finances, especially when there is a change in global oil prices, a leakage that should have been directed towards spending on health and education.

In this paper, we examine the relationship between fuel subsidy and economic growth of selected energy producing and exporting countries during 2010-2020. In this context, the introductory part of the study examines the volume of fuel support in the world and underlines its importance. The second part reviews experimental studies found in the literature on fuel support and economic growth through several channels. The third part of the study provides information on the data and methods used in the study. The fourth part shows the empirical approach and research results obtained. The final part of the study gives concluding observations and a summary of the results.

Literature review

High levels of fuel subsidy policies are contributing undesirable consequences to economic growth channels, as evidenced by several experimental studies (Clements et al. 2013). Subsidized energy prices may lead to lower producers' profits, making it difficult for State-owned enterprises to expand productive activities, with the private sector reluctant to invest in the energy sector (Foster, 2009).

Inadequate infrastructure and subsidized fuel prices also lead to a decline in economic growth, as highlighted in the (Mundaca, 2017) study. The study emphasized that there are at least three advantages in eliminating or reducing fuel subsidies: (1) it increases entrepreneurial activities and increases employment rates; (2) it also results in a higher efficiency in the use of production inputs; (3) and it allows for the economization of many expenditures that can be reinvested in other areas.

In another direction, the policy of subsidizing energy products undermines the competitiveness of the private sector. This issue was highlighted by the study conducted by (Clements et al., 2007), which assessed the impact of rising oil prices on real growth, overall prices, and income distribution in Indonesia. The study employed a computable general equilibrium (CGE) model across multiple sectors for the year 1995. The findings demonstrated that subsidy policies lead to pricing below cost levels and also affect the costs of other sectors, such as manufacturing, mining, and electricity, which rely on subsidized fuel and coal as inputs in their production processes. Consequently, this results in lower prices for electricity, manufacturing, and mining sectors. The simulation results of the study concluded that, despite the absence of direct electricity subsidies in this case, the policy leads to an inefficient allocation of resources across various economic sectors. This, in turn, drives excessive consumption of cheap and subsidized technologies. As a result, resources become concentrated in energy-intensive activities, fostering the emergence of numerous non-competitive industries.

Furthermore, the study by (Fofana et al., 2009) indicated that the negative effects of energy subsidies on private sector competitiveness can be mitigated through appropriate macroeconomic policies. The savings generated from energy subsidy reforms can enhance firms' competitiveness in the long run.

This finding was reaffirmed by the study conducted by (Rentschler et al., 2017), which examined the impact of energy subsidy reforms on corporate competitiveness in Saudi Arabia. The research highlighted the direct and indirect channels through which firms respond to energy price shocks, using a computable general equilibrium (CGE) model across multiple enterprises. The study's results concluded that increased costs (both direct and indirect) do not necessarily translate into competitiveness losses, as firms have several mitigation strategies to absorb price increases. These strategies include: absorbing cost shocks in profit margins, fuel substitution, enhancing energy efficiency and resource productivity, passing on international price increases to local prices.

In terms of the impact of fuel subsidies on rational energy consumption, reforming support allows for improved rational energy use and enhanced growth thanks to additional returns from support (Birol et al,, 1995).

The Energy Subsidy Policy also contributes to the poor distribution of resources to energy-intensive industries and activities such as cement and fertilizer in Egypt, which there is no impact of energy subsidy reduction on the profits of these companies, where their sales prices can be kept unchanged for higher profit rates (Shehata, 2008). The flaw of this study is that it is limited in energy-intensive industries only and has not addressed other sectors affecting lower income groups.

(Holton, 2012) attempted to assess the impact of fuel subsidies on economic growth, the environment, and social justice of a sample of developing countries during 2002-2009 using the Panel Data Model. The study found significant results, including subsidizing fuel by 10 US cents per liter contributes to reducing GDP per capita by 0.015% and fails to achieve social justice. This gives several questions as to the viability and legitimacy of these policies in many States, with energy-intensive industries and rich families benefiting from such support.

The Energy Subsidy Policy reduces expenditure to promote growth items, such as health care, education, and social safety nets, as well as infrastructure. Studies in this area have gained a wide range of attention. Using the price gap approach, (Koplow, 2014) compared the volume of energy product support for some states with the amount spent on health care in 2011. 18 out of 37 countries with support levels were found to significantly exceed their overall expenditure on health care, and the study indicated that adopting the market prices of those countries' petroleum products would improve economic growth prospects in the long term. According to the (Regional Economic Outlook report, 2013), countries in the region spent an average of 3% of GDP on fuel subsidies in 2012, equivalent to their total public spending on health care.

If the above two studies focused their attention solely on the health care aspect, some studies undertook to explore the relationship between global energy subsidy and social expenditure, represented in both education and health expenditures, such as the (Ebeke et al., p. 2015) of a sample of 109 low- and middle-income countries during (2000-2011) using the Panel model. The study's results found that energy subsidies are actually higher than social expenditure, noting that an increase of 1% of GDP in energy subsidy results in an average reduction in public spending in education and health by 0.6% of GDP. Furthermore, the study found that crowding out subsidies for social spending was stronger in low-income and oil-importing countries, as well as in countries with weak government institutions.

It can be argued from previous studies that subsidies occupies a large proportion of government budgets, and thus its removal can lead to significant financial savings and free up resources for governments to invest in sectors such as health and education, affecting the promotion of human capital development.

On the other hand, the phenomenon of fuel smuggling is widespread in many regions such as North Africa, the Middle East, and North America, according to Heggie, (1998), the lower domestic fuel prices are than in neighboring countries, the more incentives it creates towards smuggling. It also contributes to overburdening the overall budget of the support country, as confirmed in the World energy outlook report, (2013), which noted that the proliferation of fuel subsidies encourages smuggling activities among neighboring countries, thereby contributing to increased expenditures at the level of the support country's budget, while limiting tax revenues at the level of the country to which goods are smuggled. In the State of Iran, more than 60 thousand barrels per day of fuel are smuggled out of the country every day, especially towards Pakistan, where diesel is sold at up to $ 0.12 per liter in Iran compared to $ 1 per liter in Pakistan. In Southeast Asia, where smuggling has long been a major problem, the price of gasoline in Indonesia is almost 60% lower compared to a number of neighboring countries. Furthermore, the Philippine State, where fuel is smuggled, indicates that its tax revenues are reduced by about $1 billion a year as a result of illicit purchases.

Although the subject of smuggling received little attention from researchers, the study of (Mlachila, 2016) is one of the few contributions that systematically analyze the volume and effects of fuel subsidies on smuggling activities by studying Nigeria's situation as a major oil exporter and petrol subsidizer. The study examined the restrictions imposed by negative external factors (smuggling to the State of Benin and Togo) on the application of fuel price adjustment mechanisms, where the study estimated that 85% and 70% of gasoline consumed in both Benin and Togo respectively were smuggled from Nigeria in 2011. The study's findings concluded that the price adjustment mechanism was one of the ways of reducing fuel support expenditure but was influenced by the existence of negative external factors. The study also showed that the smuggling phenomenon had negative effects on growth, resulting in high levels of theft, violence and sabotage, reduced oil production in Nigeria and affected neighboring countries by their inability to tax.

After reviewing and addressing the most important experimental studies from several angles, some of the studies agreed that there were negative effects on economic growth through several channels. The findings of most empirical studies concluded on a common goal of reviewing energy support policy, formulating comprehensive reform measures capable of protecting the poor class, and helping national economies to adapt to these measures.

Through differences and agreement, we note that the current study is consistent with previous studies in its main theme and overall objective. However, our current study is distinct from the rest of the studies in trying to build a model that studies the impact of fuel subsidies on economic growth for a recent period (2010-2020) of a sample of energy exporting countries that strongly support fuel.

Experimental

Data and model

The study analyzes the impact of fuel subsidies on economic growth by using data of 11 exporting energy between 2010-2020 period.

This study uses on its econometric side a built-in database (cross-sections and time series) with a number of n = 11 CTs (i) of 11 countries. At the same time, each CT unit has a time series for a number of periods t = 11, covering the time limit from 2010 to 2020. Thus, the number of observations used in the analysis (t * n) will be 121 observations.

Description of variables:

The variables used in our study were selected based on previous studies on the topic of the impact of fuel subsidies on economic growth. The study variables can be defined through the following Table 1.

Table 1. Study variables

Variable symbol	Variable Name	Study data sources
GDPGpercapita	GDP per capita growth (annual %)	World Bank database
S-ffuel	fuel subsidies (% of GDP)	IEA Database
OilR	Oil resource revenues, (% of GDP)	World Bank database
GCF	Gross capital formation (% of GDP)	World Bank database
Opens	Trade (% of GDP)	World Bank database
Inf	Inflation (annual %)	World Bank database

Source: Made by the researchers.

Description of the sample of States used in the study

The study community consists of 11 energy producing and exporting countries, with Algeria, Azerbaijan, Angola, Iran, Bahrain, Gabon, Kuwait, Kazakhstan, Egypt, Mexico, and Nigeria. The study period covers 11 years from 2010 to 2020.

These countries were chosen for the availability of their own data. Despite the different living standards and different systems of government in them, they constitute a mixture of similarities in their economies because they are classified as members and non-members of the Organization of the Petroleum Exporting Countries. They are among the countries that strongly support fuel prices and have initiated reform measures in their prices. Below is an explanation of the selected countries.

For OPEC Member Countries:

- Algeria: Algeria is a major oil producer and ranks first in gas production. Its economy is primarily rent-based, relying on hydrocarbon exports and lacking economic diversification, making its resources highly dependent on fluctuations in international oil prices. Due to its consumption-oriented nature, Algeria subsidizes widely consumed energy products, including fuel, liquefied petroleum gas (GPL), electricity, and natural gas. Following the oil price decline crisis in mid-2014, Algeria initiated gradual price reforms for these products starting from January 1, 2016.
- Angola: Angola's economy is heavily dependent on oil production. In 2017, the crude oil and natural gas sector accounted for about 30% of the country's GDP, 95% of total exports, and approximately 52% of total fiscal revenues. Both fuel and electricity are among the most heavily subsidized energy products in Angola (EIA, 2019).
- Iran: Iran is among the top 10 oil producers and top 5 natural gas producers globally. In 2019, energy subsidies accounted for 18.8% of GDP, amounting to $86 billion according to the International Energy Agency (IEA). Due to the significant burden of these subsidies on public finances and the economic sanctions imposed on the country, Iran initiated gradual reforms in fuel and electricity prices starting from December 1, 2010.
- Gabon: Gabon is rich in natural resources, including diamonds, gold, uranium, and hydropower. However, its economy relies heavily on oil production and exports, which accounted for 45% of total government revenues in 2014. Gabon provides significant subsidies on fuel and natural gas (EIA, 2019).
- Kuwait: Kuwait is one of the largest oil producers worldwide, ranking sixth in terms of proven oil reserves. It has a relatively small population and a thriving economy, with oil sales contributing 40% of GDP and 90% of government revenue. Despite ongoing reform efforts over the years, fuel, electricity, and natural gas remain heavily subsidized in the region (K.E.O, 2019).

- Nigeria: The petroleum sector plays a crucial role in Nigeria's economy. However, the benefits of this resource are diminished due to significant energy subsidies and widespread fuel smuggling to neighboring countries. Between 2011 and 2014, the cost of energy subsidies was estimated at $35 billion (Kojima, Masami, 2016). In mid-2011, the Nigerian government decided to implement a gradual reform of gasoline prices while introducing mitigation measures for the population, including promoting public transportation, expanding conditional cash transfer programs for households, and creating job opportunities for the most vulnerable populations (FAD et al., 2013).

For Non-OPEC Energy-Producing Countries:

- Azerbaijan: Azerbaijan's crude oil and natural gas production and exports are fundamental to its economy. The country is considered a successful case in energy subsidy reform, having undertaken electricity sector rehabilitation and service quality improvements (Vagliasindi, 2012).
- Bahrain: Bahrain is the smallest oil-producing country among the Gulf Cooperation Council (GCC) states. Electricity is the most subsidized product, alongside fuel, in Bahrain. In 2019, energy subsidies represented 2% of GDP, amounting to $770 million, according to the IEA.
- Kazakhstan: Kazakhstan is a producer of coal, crude oil, and natural gas, as well as a major energy exporter. The country also has significant renewable energy potential, including wind, solar, hydropower, and biomass energy. Kazakhstan is one of the countries with the highest energy subsidies, accounting for 3.9% of GDP in 2019, according to IEA data (Karatayev, et clarke, M. L., 2014).
- Mexico: Mexico is one of the world's largest oil producers outside OPEC. However, its oil and natural gas production has declined over time. Electricity subsidies place a heavy burden on public finances, and reform efforts have failed due to the dominance of the state-owned electricity company and the formation of anti-reform interest groups. Additionally, Mexico's residential electricity tariff structure includes a broad range of subsidized categories (FAD et al., 2013).
- Egypt: Egypt is a member of the Organization of Arab Petroleum Exporting Countries (OAPEC). Energy and food subsidies have been a fundamental pillar of Egypt's budget for decades, becoming a major financial burden, especially after the January 2011 revolution (Verme, Paolo and Abdlekrim Araar, 2017). Consequently, the Egyptian government adopted a series of reforms aimed at reducing energy subsidies by one-third to 2.7% of the 2016/2017 fiscal budget, down from 7% in 2013/2014. The financial savings from these reforms were redirected to social spending on health and education. Egypt also aimed to continue energy pricing reforms to achieve a target of 0.5% of GDP by the 2018/2019 budget, alongside strengthening the social safety net system, particularly targeting, communication, and smart card issuance. Other key mitigation measures included enhancing public transportation and promoting fuel switching (ESMAP, 2017).

Results and discussion

Steps to estimate Panel Models

In order to achieve this objective of estimating the model and achieving the results through which it explains the impact of fuel subsidies on economic growth, the Panel model will be evaluated through several steps. Hsiao's homogeneity tests will be applied, which will allow us to ascertain the suitability of our study to the panel model. The second step is to estimate the three models.

The next step is Fisher's test, which allows choosing between a Pooled Regression Model (PRM) and the Fixed Effects Model (FEM), as well as the Hausman test, which allows choosing between a Fixed Effects Model (FEM) and a Random Effects Model (REM).

The fourth step is to determine its quality criteria so that the interpretation of the results obtained is logical in conformity with the theoretical interpretation or statistical interpretation or both.

Homogeneity test of Hsiao 1986

Homogeneity tests are important for determining the panel's data structure. In this context, Hsiao (1986) has proposed serial hypotheses that allow for determining the consistency of data or not according to several steps (Bourbonnais, 2021). Based on the outputs of Eviews, the following results have been obtained:

Table 2. Homogeneity test results of (Hsiao, 1986)

Hypotheses	F-stat	P-value
H1 (calculated Fisher F_1)	1.703740	0.046822
H2 (calculated Fisher F_2)	1389205	**0.154315**
H3 (calculated Fisher F_3)	2.870232	0.003666

Source: Prepared by researchers based on Eviews 10 outputs.

We note from Table 2 that the probability value of the calculated Fisher's statistic F_1 is (0.046822), which is significantly less than 0.05, allowing us to reject the null hypothesis (i.e. no total homogeneity).

Moving on to the second step, the probability value of the calculated Fisher's statistic F_2 is (0.154315), which is significantly greater than 0.05, allowing us to accept the null hypothesis stating that the regressive parameters of explanatory variables are the same between individuals, and that the source of the difference may be in the intersectional parameters.

In the third step, we note that the probability value of the calculated Fisher's statistic F_3 is (0.003666), which is less than 0.05, allowing us to reject the null hypothesis stating that intersectional parameters are identical between individuals, that is, we are in the case of a model with individual effects.

Estimation of panel models

To achieve this goal, three models will be applied: the Pooled regression model, the fixed effects model, and the random effects model. Based on Eviews 09, we obtained the following results:

Table 3. Results of estimating Panel models

	Pooled regression model	Fixed effects model	Random effects model
C	2.281212 (0.0834)	-7.552244 (0.0022)	0.973246 0.4874
S-ffuel **P-value**	0.070670 0.2779	**-0.190172** **(0.0221)**	0.024527 0.6942
OilR **P-value**	-0.044949 0.0725	**0.206436** **(0.0001)**	0.014663 0.5909
Opens **P-value**	-0.004419 0.6659	0.025530 (0.3373)	0.002632 0.8186
GCF **P-value**	-0.015415 (0.6780)	**0.148178** **(0.0272)**	-0.002415 0.9509
Inf **P-value**	-0.111392 0.0163	**- 0.139337** **(0.0038)**	-0.120293 0.0040
R-squared	0.075501	**0.478301**	0.060293
Adjusted R-squared	0.035306	**0.403772**	0.019436
F-Stat	1.878352	**6.417696**	1.475720
Prob (F-statistic)	0.103444	**0.000000**	0.203125
Durbin-Watson stat	1.089489	**1.640419**	1.171358

Source: Prepared by researchers based on EVIEWS 10.

When estimating both the pooled regression model, the fixed effects model, and the random effects model, we use the following statistical tests:

Fisher's test

Fisher's exact test allows choosing between the pooled regression model and the fixed-effect model, i.e., whether or not a difference exists between states, under the following hypotheses:

– H0: The pooled regression model is the appropriate one.
– H1: The Fixed Effects Model (FEM)(FEM)is the appropriate one.

Based on Eviews 10, we reached the following results:

Table 4. Fisher's test results

Effects Test	Statistic	d.f.	Prob.
Cross-section F	8.106960	(10,105)	**0.0000**

Source: Prepared by researchers based on EVIEWS 10.

Through Table 4, we note that the (Cross-section F) value is (8.10696) and the probability value is 0.0000, which is less than 0.05, and therefore we reject the null hypothesis and accept the alternative hypothesis. Thus, the Fixed Effects Model (FEM) is the suitable one.

Hausman's test

The Hausman test allows us to choose between the Fixed Effects Model (FEM) and the random effects model, testing the two models' estimate under the following hypotheses:

– H0: The random effects model is the appropriate one.
– H1: The Fixed Effects Model (FEM) is the appropriate one.

The test results are shown in the following Table 5.

Table 5. Hausman's test results

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	53.602211	5	**0.0000**

Source: Prepared by researchers based on EVIEWS 10.

Hausman's test results indicate that it is statistically significant at a level of 0.05, where the P-value of the test was 0.0000, thus rejecting the null hypothesis and accepting the alternative hypothesis stating that the Fixed Effects Model (FEM) is the appropriate model for our study.

Statistical interpretation of the results of fixed effects model

Based on Hausman's selection test between models, the fixed effects model is the appropriate model, so the results can be interpreted as follows:

– Statistical significance test of estimated parameters (Student Test):

We note from Table 3 that all P-values of fuel subsidies as a percentage of GDP (0.0221), oil rents as a percentage of GDP (0.0001), the gross capital formation as a percentage of GDP (0.0272), and the annual growth rate of inflation (0.0038) are below the significance level of 0.05, that is, its estimated parameters are significantly different from zero (they have statistical significance), and therefore there is a statistically significant correlation of these variables with the annual growth rate of GDP per capita.

Whereas the P-value of trade openness as a percentage of GDP (0.3373) was higher than the significance level of 0.05, which means that its estimated parameters are not significantly different from zero (not statistically significant). Therefore, there is no statistically significant relationship between these variables with the annual growth rate of GDP per capita.

– Goodness of fit test (R-squared):

According to the model results in Table 3, the R-squared value has reached 0.478301, indicating that independent variables contribute to interpreting 47.83% of economic growth. Other variables not included in the model (economic, social, and other factors) interpret the remaining 52.17%, which is included in the margin of error.

– Model quality test (F-statistics):

Through the results of Table 3, Fisher's statistic of the model is equal to 6.417696 with an estimated P-value of 0.000000, which is completely below the significance level of 0.05. This means that the estimated parameter is significantly different from zero, and therefore the estimated model has a total statistical significance at the significance level of 0.05, allowing us to say that the model has a statistical significance as a whole. All model parameters as a group intrinsically affect the dependent variable. On the other hand, the statistical value (DW = 1.64) is approximately equal to (2), which confirms the absence of an autocorrelation problem between errors. Hence, the general result is that the model is statistically acceptable.

Analysis and discussion of results:

Based on Table 5 which shows the results of the Panel Model Estimation and based on Hausmann test results indicating that the Fixed Effects Model (FEM) is appropriate, we can express the results of the study economically as follows:

- The existence of a significant negative impact of fuel subsidies on economic growth: increasing fuel subsidies by 1% will reduce growth by 0.19%. These results can be explained by the channels through which fuel subsidies policy negatively affects economic growth, such as the contribution of subsidies to the private sector's reluctance to invest in the energy sector and undermine its competitiveness, as well as the crowding out of expenditure aimed at promoting growth items such as health care, education, and social safety nets.
- The existence of a significant positive impact of gross capital formation as a percentage of GDP on economic growth: an increase in total capital formation by 1% will increase growth by 0.14%. This result is consistent with economic theory assumptions that emphasize the role of domestic investments in stimulating economic growth through spending policies geared towards procurement of machinery and equipment, investment in infrastructure projects, and focusing on sensitive sectors such as education, health, provision of water to the population, which improves the productivity of productive elements such as capital and work, thereby improving people's living standards and reducing unemployment.
- The existence of a significant negative impact of inflation, which is annual growth rate of inflation: any increase in the education rate by 1% will reduce growth by 0.13%.
- The existence of a significant positive impact of oil resource revenues on economic growth: an increase of 1% in oil resource revenues will increase economic growth by 0.20%. The incomes of the oil resources sector contribute to supporting productive sectors and broadening the base of the domestic economy of the sample states, as well as stimulating trade exchange and raising the population's living standards.
- The existence of an insignificant positive impact of trade openness on economic growth: increasing the rate of trade openness by 1% will increase growth by 0.02%.

Conclusion

The present study aims to determine the impact of fuel subsidies on economic growth in a sample of energy-exporting countries. The Panel model was used, with data on GDP per capita annual growth rate, and fuel subsidy variables. According to the study's findings, the fuel subsidy policy hurts the economic growth of the countries studied. This result is consistent with several previous studies that have confirmed the negative impact of fuel subsidies on economic growth channels. This result casts doubt on the policy's long-term viability in several countries. Even though subsidies are intended to protect consumers, they exacerbate social spending in areas such as health and education and exacerbate fiscal imbalances. This may encourage governments to implement reforms affecting the overall subsidies system, allowing economic balance to be restored and a transition to a more targeted social assistance system to be made.

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