# ARE THERE ANY ASYMMETRIC RESPONSES OF OIL PRICE SHOCKS TO GDP GROWTH? A REVIEW OF LITERATURE

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***Abstract:***

*This study focuses on the well-established fact about the relationship between volatility of oil prices and economic growth in sample oil exporting and importing countries. A systematic literature review is used to explore the related scientific studies and the collected metadata has been analyzed systematically to disclose the asymmetric responses of oil price shocks to GDP growth. It is revealed that the impact of oil price shocks on growth varies from short to long-run, from one country to another depending on economic characters. Sometimes found symmetric but often asymmetric responses of oil price shocks to GDP growth has been observed by scientific researchers in both oil exporting and importing countries. Therefore, the ambiguity of the relationship demands international oil price stabilization polices.*

***Keywords:*** *Oil Price Shock, Economic Growth, Asymmetric, and Symmetric Responses*

***JEL classification:*** *E31, 047, N1*

## Introduction

Macroeconomic fluctuation is a cause of oil price volatility (Brinin et al. 2016) over the world and the volatility also affects the stabilization policies of both oil exporting and importing economies (Saddiqui et al. 2018; Alekhina and Yoshino, 2018). There are evidences that some economics are benefited while others are lost by the oil price shock (Peersman and Robays, 2012; Taghizadeh-Hesary et al. 2016). For instance, depending on the country's position whether it is an oil-exporter or an oil-importer, the relationship between oil price and market stock varies significantly (Aydoğan et al. 2017). Although increase in oil price has positive impact on oil exporting countries and negative impact on oil importing countries, the volatility of price level causes uncertainty in planning of resource allocation for welfare enhancement in both types of countries (Rentschler, 2013). It is observed noticeable impact of oil price volatility on the people's welfare over the world (Mgbame et al. 2015).

The real impact of oil price changes differs from oil-exporter to oil-importer countries. Oil-exporting countries usually have more fund available for development budget as revenue increases by oil price rise but in case of price fall, they face the trap of budget shortage to their

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continuous expenditures (Abdelsalam, 2020). On the contrary, in case of oil-importing countries, an increase in oil price has negative impact on economic growth whereas a decrease in oil price has a reverse impact (Darby, 1982; Hamilton, 1996; Rafiq *et al*., 2009). However, as the oil exporting countries are failed to launch development project, the macroeconomic challenges are greater for them than oil-importing countries (Abderrezak, 2005). According to Donayre and Wilmot (2016), asymmetric responses of oil price shock are more visible in recessions but less visible in expansions. The asymmetric response of oil price shocks and economic growth is checked by studies in different time frame and context such as Mork (1989), Mory (1993), Mork et al. (1994), Hooker (1996a), Narayan and Narayan (2007), Gbatu et al. (2017a), Gbatu et al. (2017b), Aliyu (2011), Ayadi (2005), Balcilar et al. (2017) and they all conforms the asymmetries. But most of the studies are based on time series (Balke et al., 2010; Lardic and Mignon, 2008; Raheem, 2017) whereas panel studies are scant (Akinsola and Odhiambo, 2020). As the world is facing receission due to Covid-19 and recent war between Russia and Ukrane, it is important to understand the generic asymmetry between oil price shocks and economic growth. The following chat shows the recent trend of monthly oil price in major oil exporting counties.

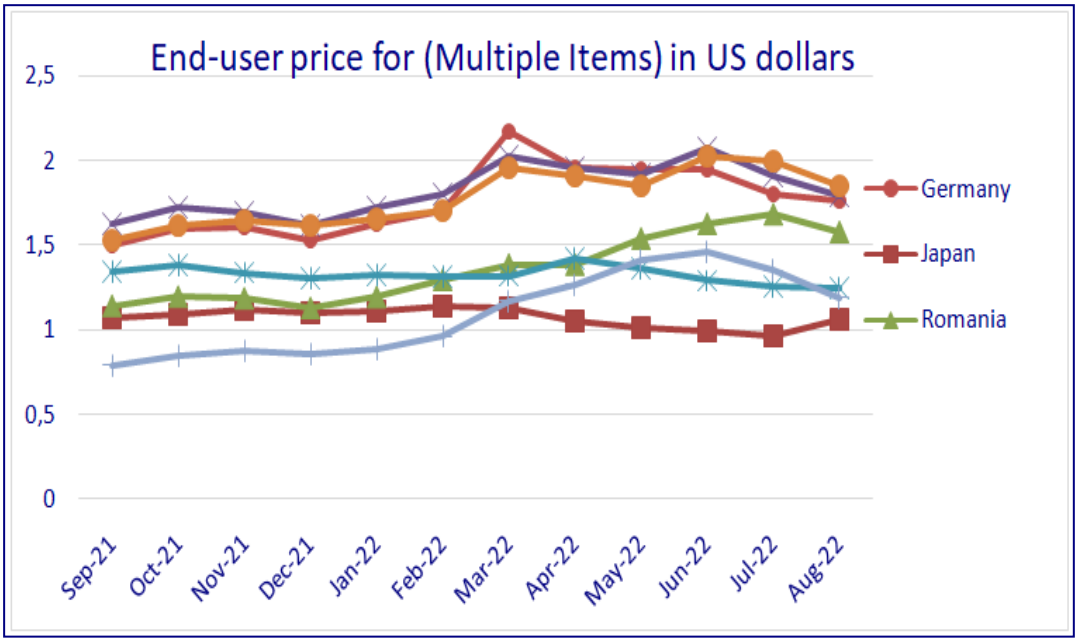


**Figure 1- IEA Energy Prices - Monthly Oil Prices Excerpt**

Therefore, the ambiguity of modeling the asymmetric effects of oil price shocks to economic growth can be a great policy issue for the energy transition towards alternative mechanism. To understand the derived dynamics in the existing scholarly, the study investigates whether there are asymmetric responses of oil price shocks to economic growth in both oil exporting and oil importing countries based on the existing literature review approach.

## Methods and Materials

The study applies literature review approach by starting with the first step of settling the research questions. In order to building a meta-analytic database, an SPSS data file is constructed in the second step by literature search approach following Abbass et al. (2022) where a clear selection criterion and clear list of methods for searching the literature are maintained. The search criteria are to follow the underline keywords regarding the answers of

the study questions whereas the Scopus, web of science, Econ-papers, Google scholar etc. databases are searched during the period of 17 years from 2005 to 2022. The analysis framework is graphed in the following flowchart.

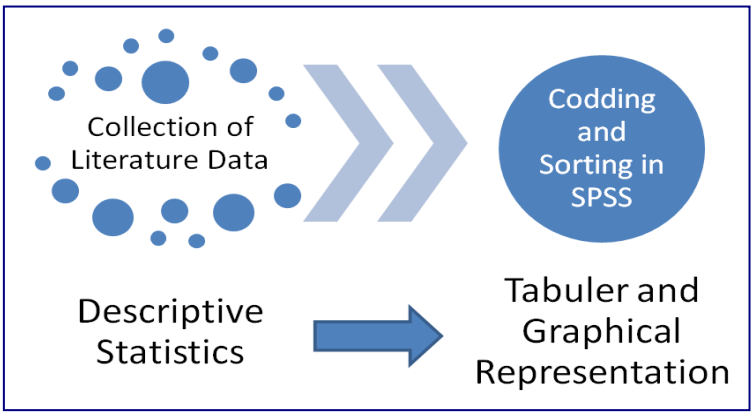


**Figure 2- Analysis Framework**

## Results and Discussion

In order to disclose the scientific evidences of the asymmetric responses of oil price shocks on the economic growth of oil-exporter and oil-importer economics, the researchers extensively have reviewed 28 recent scientific studies from 2000 to 2022. The sample studies with the respective area and year are as give bellow.

**Table 1.**

**The Scientific Studies on the Asymmetric Responses of Oil Price Shocks to Economic Growth**

| Sl. | Author/s | Year | Sample Area |
|---|---|---|---|
| 1 | Ahmad et al. | 2022 | South Asian countries |
| 2 | Rodríguez-Benavides et al. | 2022 | Mexico |
| 3 | Ahmadi, Manera | 2021 | oil-exporter economies |
| 4 | Sarmah, Bal | 2021 | India |
| 5 | Bünyamin et al. | 2021 | South Africa |
| 6 | Abdelsalam | 2020 | MENA countries -oil exporting and importing |
| 7 | Bala, Chin | 2020 | Malaysia |
| 8 | Akinsola, Odhiambo | 2020 | oil-importing sub-Saharan African (SSA) countries |
| 9 | Gbatu et al. | 2017b | Liberia |
| 10 | Gbatu et al. | 2017a | West African Countries |
| 11 | Sadeghi | 2017 | oil exporting countries |
| 12 | Bergmann | 2017 | 12 oil exporting and importing-US, UK, Japan etc. |
| 13 | Rotimi, Ngalawa | 2017 | Africa's net oil exporting economies |
| 14 | Donayre, Wilmot | 2016 | Canadian Economy |
| 15 | Rahma et al. | 2016 | Sudan economy |
| 16 | Gadea et al. | 2016 | US economy |
| 17 | Aliyu | 2011 | Nigeria |
| 18 | Rafiq and Salim | 2011 | Asian Countries |
| 19 | Berument et al. | 2010 | MENA countries-oil exporter and importer |
| 20 | Ersoy | 2010 | US economy |
| 21 | Du and Wei | 2010 | China |
| 22 | Jiménez-Rodríguez | 2009 | US economy |

| | | | |
|---|---|---|---|
| 23 | González, Nabiyev | 2009 | U.S.A and Sweden |
| 24 | Rafiq et al. | 2009 | Thailand |
| 25 | Jiménez-Rodríguez, Sánchez | 2005 | OECD countries |
| 26 | Guo and Kliesen | 2005 | US economy |
| 27 | Huang et al. | 2005 | US, Canada, and Japan |
| 28 | Kdoroodian, RoyBoyd | 2003 | US economy |

*Source- Authors' Own Research*

The diverse types of methodologies are used to find out the exact relationship between oil price shocks and economic growth considering other theoretical variables. The summary of the applied methods to check the asymmetries is given in the following pie chart. The following chart presents that authors' choice dominates VAR-Vector Autoregression and SVAR-Structural Vector Autoregression approaches in designing their methodologies over the years.

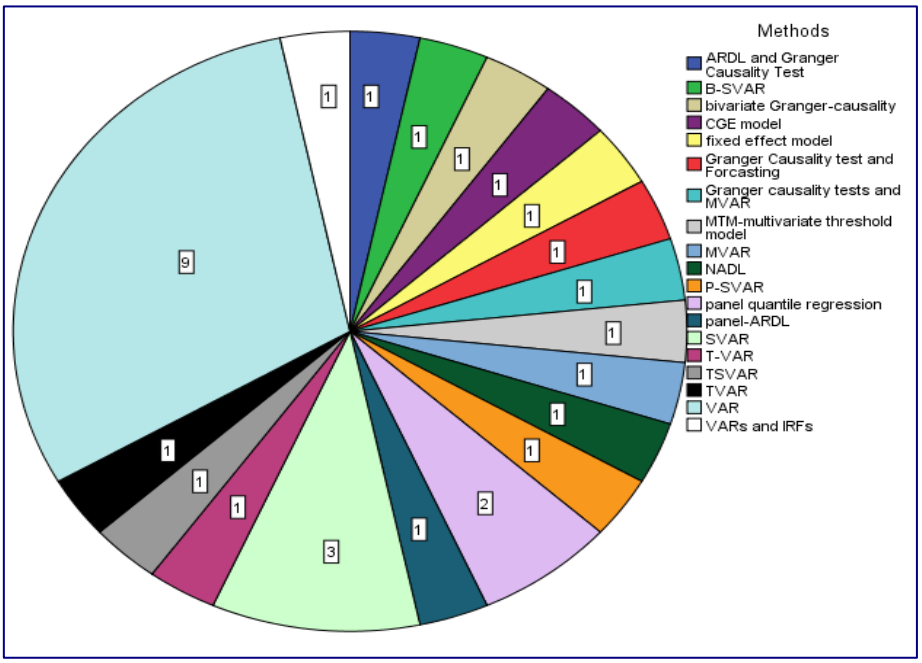


**Figure 3- Types of Methodologies**

According to the number of conducted study results, the study finds that earlier studies dominantly found that there are asymmetric responses of oil price shocks to economic growth according to diverse methodologies and context. Moreover, some studies found symmetric, linear, non-linear and unidirectional causal relationship as well (see figure 4).

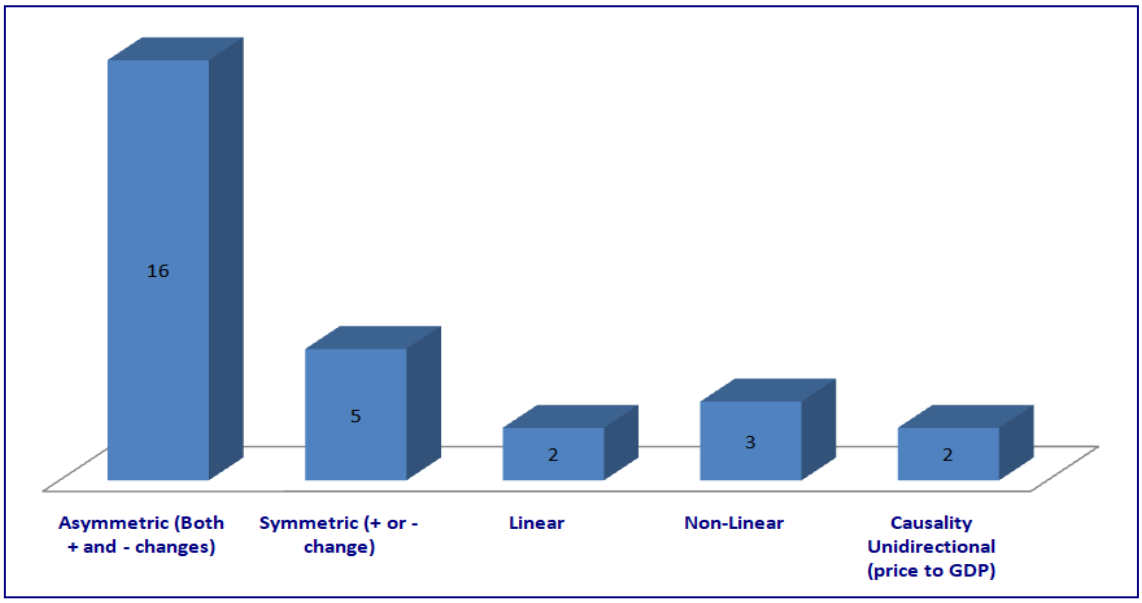


**Figure 4- Types of responses of oil price shocks to economic growth (No. of Study Results)**

The theoretical and empirical studies on the asymmetric impacts of oil price shocks on economic growth differ from country characteristics, methodologies and over the periods of analysis. It is widely believed that oil price rise has positive impact on the economic growth of oil exporting countries but negative on the economic growth of oil importing countries. The impact differs in opposite directions in case of oil price decrease. However, the economies of oil rich countries have significantly affected by the oil price volatility while oil poor countries are less affected. The following table 2 shows that the effect of oil price change varies significantly by the types of oil trading characters of the sample countries.

**Table 2.**

**Impact of Oil Prices on the Economic Growth by the Types of Oil Trader**

| | | Impact | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AS | L-PO | N/A | NE | NL | NO | NO, AS | NU | PO-L, NE-NL | PO-U | PO-U_D | |
| Type of Oil Trader | Exporter | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 9 |
| | Exporter/Importer | 5 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 8 |
| | Importer | 6 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 11 |
| Total | | 16 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 28 |

Note: AS-Asymmetric, L-PO-Linear and Positive, N/A-Not Applicable, NE-Negative, NL-Non-Linear, NU-Neutral, NE-NL-Negative and Non-Linear, PO-U-Positive but Unidirectional to Increase and PO-U-D- Positive, Unidirectional but Decrease RR

*Source*- Authors' Own Research

## Conclusion

In this paper, the study aim is to present the scientific evidences of the asymmetric responses of oil price shocks to economic growth. The study is designed to review the recent studies during the period of 2000 to 2022, considering the methodologies and context of sample areas. The analysis framework is evidence based and simple descriptive statistics is used to present the results. The study reviews that there are studies about the asymmetries of the relationship between oil price and economic growth in the context of developing, developed, oil-exporting, oil-importing and both trading character countries. It is found that, earlier studies represent the asymmetric responses of oil price shocks to economic growth according to diverse methodologies and context. Moreover, some studies found symmetric, linear, non-linear and unidirectional causal relationship. Therefore, the present study suggests that further studies on the issue of asymmetric relationship between oil price shocks and economic growth could integrate the fact of diversity in methods and presentation based on different sample context using recent databases.

## Bibliography


Abbass, K., Qasim, M.Z., Song, H. et al. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. Environ Sci Pollut Res 29, 42539-42559.

Abdelsalam, M.A.M. (2020). Oil price fluctuations and economic growth: The case of MENA countries. Review of Economics and Political Science.

Abderrezak, A. (2005). Oil price shocks-money supply causality: Some evidence from Algeria. Journal of North African Studies, 10(2), 173-181. Available at: https://doi.org/10.1080/13629380500252218

Alekhina, V. and N. Yoshino. (2018). Impact of World Oil Prices on an Energy Exporting Economy Including Monetary Policy. ADBI Working Paper 828. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/impact-world-oil-prices-energyexporting-economy-including-monetary-policy

Aliyu, S.U., (2011). Oil price shocks and the macroeconomy of Nigeria: a non-linear approach. J. Int. Bus. Entrepreneurship Dev. 5 (3), 179–198.

Ayadi, O.F., (2005). Oil price fluctuations and the Nigerian economy. OPEC Energy Rev. 29 (3), 199–219.

Aydoğan, B., G. Tunç, and T. Yelkenci. (2017). “The impact of oil price volatility on net-oil exporter and importer countries’ stock markets,” Eurasian Economic Review, 7(2), 231–253.

Balcilar, M., van Eyden, R., Uwilingiye, J., Gupta, R., (2017). The impact of oil price on South African GDP growth: A Bayesian Markov switching-VAR analysis. Afr. Dev. Rev. 29 (2), 319–336.

Balke, N.S., Brown, S., Yücel, M., (2010). Oil Price Shocks and US Economic Activity: An International Perspective. Research Department Working Paper 1003, Federal Reserve Bank of Dallas.

Brini, R., Jemmali, H. and Farroukh, A. (2016). Macroeconomic impacts of oil price shocks on inflation and real exchange rates: evidence from MENA economies, Topics in Middle Eastern and African Economies, Vol. 18 No. 2, pp. 170-185.

Darby, M. R., (1982). The price of oil and world inflation and recession. *The American Economic Review, 72*(4), 738-751.

Donayre, L., & Wilmot, N. A. (2016). The Asymmetric Effects of Oil Price Shocks on the Canadian Economy. *International Journal of Energy Economics and Policy*, *6*(2), 167–182.

Du, L., Wei, C., (2010). The relationship between oil price shocks and China's macroeconomy: An empirical analysis. Energy Policy 38, 4142–4151.

Gbatu, A.P., Wang, Z., Wesseh, Jr., P.K., Tutdel, I.Y.R. (2017a). Asymmetric and dynamic Effects of oil price shocks and exchange rate fluctuations: Evidence from a panel of the economic community of West African States (ECOWAS). Int. J. Energy Econ. Policy 7 (3), 1–13.

Gbatu, A.P., Wang, Z., Wesseh, Jr., P.K., Tutdel, I.Y.R. (2017b). The impacts of oil price shocks on small oil-importing economies: Time series evidence for

Guo, H., Kliesen, K., (2005). Oil price volatility and U.S. macroeconomic activity. Federal Reserve Bank St. Louis Rev. 87 (6), 669–683.

Hamilton, J. D. (1996). This is What Happened to the Oil Price-Macroeconomy Relationship. *Journal of Monetary Economics 38*, pp.215-220.

Huang, B.-N., Hwang, M.J., Peng, H.-P., (2005). The asymmetry of the impact of oil price shocks on economic activities: an application of the multivariate threshold model. Energy Economics 27, 455–476.

Jiménez-Rodríguez, R., Sánchez, M., (2005). Oil price shocks and real GDP growth: empirical evidence for some OECD countries. Appl. Econ. 37 (2), 201–228. http://dx.doi.org/10.1080/0003684042000281561.

Lardic, S., Mignon, V., (2008). Oil prices and economic activity: An asymmetric cointegration approach. Energy Econ. 30 (3), 847–855.

Liberia. Energy 139, 975–990.

Mork, K.A., (1989). Oil and the macroeconomy when prices go up and down: an extension of hamilton's results. J. Political Econ. 97 (3), 740–744.

Mork, K.A., Olsen, Ø., Mysen, H.T., (1994). Macroeconomic responses to oil price increases and decreases in seven OECD countries. Energy J. 1, 9–35.

Mory, J.F., (1993). Oil prices and economic activity: Is the relationship symmetric?. Energy J. 14 (4), 151–161.

Narayan, P.K., Narayan, S., (2007). Modelling oil price volatility. Energy Policy 35 (12), 6549–6553.

Peersman, G., and I. Van Robays. (2012). "Cross-country differences in the effects of oil shocks," Energy Economics, 34(5): 1532–1547.

Rafiq, S., Salim, R. and Bloch, H. (2009). Impact of crude oil price volatility on economic activities: An empirical investigation in the Thai economy. *Resource Policy, 34*(3), pp.121-132.

Rafiq, S., Salim, R., (2011). The linkage between energy consumption and income in six emerging economies of Asia: an empirical analysis. Int. J. Emerg. Mark. 6 (1), 50–73.

Rafiq, S., Salim, R., Bloch, H., (2009). Impact of crude oil price volatility on economic activities: An empirical investigation in the Thai economy. Resour. Policy 34 (3), 121–132.

Raheem, I.D., (2017). Asymmetry and break effects of oil price-macroeconomic fundamentals dynamics: The trade effect channel. J. Econ. Asymmetries 16, 12–25.

Rentschler, J. (2013). Oil Price volatility – its risk on economic growth and development, World Bank Blog, https://blogs.worldbank.org/developmenttalk/oil-price-volatility-its-risk-economic-growth-and-development.

Saddiqui, S.A., Jawad, M., Naz, M. and Niazi, G.S.K. (2018). Exchange rate, fiscal policy and international oil prices impact on oil prices in Pakistan: a volatile and granger causality analysis. Review of Innovation and Competitiveness, Vol. 4 No. 1, pp. 27-46.

Taghizadeh-Hesary, F., N. Yoshino, M. Mohammadi Hossein Abadi, and R. Farboudmanesh. (2016). “Response of macro variables of emerging and developed oil importers to oil price movements,” Journal of the Asia Pacific Economy, 21(1): 91–102.