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How Does Uncertainty in Economic Policy React to Oil Price Shocks in Australia?

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Abstract

After the financial crisis and during the recession, the concept of economic policy uncertainty (EPU) received a significant amount of attention from researchers and policymakers. The variations in the uncertainties of such policies have been found to have a strong impact on certain economic factors, such as investments and inflation. Investors are most affected by this uncertainty, as they have no clear idea how their investment decisions will impact the economy. In light of this, the researcher has designed this study to explore and analyze the impact of oil price shocks (OPS) in Australia on EPU. Two categories of OPS have been taken into account: oil supply shocks (OSS) and oil shocks (OS) as a result of global demand (GD). The data collected in this study is a time series that covers a period of 28 years in total. Following the data collection, the researcher applied different techniques and tests—the most important of which was a Vector Auto Regression (VAR) model. The results of the current study, which were obtained through the application of a VAR model, indicate that the impact of OPS on EPU varies depending on the time period. In the short-term, the impact is positive; however, in the medium-term, the impact becomes negative and, in the long-term, this impact becomes positive and significant again

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1. Introduction

Since the 1960s, Australia has been producing oil commercially and it is currently home to 0.7% of the proven oil reserves of the world. It is the largest oil-producing state, accounting for 66% of Australia's oil (O'Mahony & Lobo, 2017; Ville, Wicken, & Dean, 2019). In 2017, the Australian government released a report on peak oil, which was entitled BITRE 117. In this report, different estimations have been made based on the previous year's performance with regard to the global oil supply versus air passenger movements (APM) in the airports of Australian cities (Tsui & Balli, 2017).

The present research is based on critically evaluating the influence of OSS and OS due to GD on overall EPU factors within the Australian state. This research will help to elucidate geopolitical risk and its influence on the overall economic growth (EG) of a developed state. The main objectives of this paper are: to critically investigate the effect of OSS on EPU in the Australian market; to critically analyze the effect of OS due to GD on EPU in the Australian market; to critically evaluate the influence of geopolitical risk on the EG of Australia. This is a challenging and informative research study that seeks to fill the gaps of previous research studies that considered OPS and EPU from a different perspective. For example, some scholars have considered these variables from the perspective of the Chinese market (Wei, 2019) and others have explored geopolitical risk and stock price fluctuation as a result of OPS in Malaysia (Hailemariam, Smyth, & Zhang, 2019). Furthermore, some have explored the impact of coronavirus on crude oil prices and how this has

affected EPU in America (Albulescu, 2020). However, as of yet, no studies have focused on Australia when considering the impact of OPS on EPU.

This paper takes an informational approach to the Australian administration, its business community, foreign investors and economic policymakers, in order to understand the influence of oil price fluctuation on EPU. This research will provide stakeholders with new directions for the creation of effective policies to overcome geopolitical risk. This information will help local Australians and their authorities to understand their responsibilities in this area. Future scholars can utilize this data when considering their research variables.

Section 1 of this study focuses on providing a detailed introduction to the study's selected variables, problem statement, objectives, and other significant factors that require justification; Section 2 provides a detailed description of all previous research and the theoretical background of the variables; Section 3 presents the research methodology and the data collection mechanisms; Section 4 presents the results and analysis, in order to interpret the statistical outcomes; and finally, the discussion and conclusion section will summarize all the research outcomes, as well as exploring the study's limitations and future implications.

2. Literature Review

The uncertainty bearing theory of entrepreneurship was developed by Frank Hyneman Knight, an American economist, who noted the risk associated with profit in a business (Zeng, Kang, Wen, & Zio, 2018). The majority of insurance companies undertake this risk in the form of a return premium. This research theory is often considered when making major changes to economic policies and other related projects. In the Journal of International Money and Finance, researchers considered this theory when evaluating the impact of high uncertainty on monetary policy shocks within a state, concluding that collective consumption and GDP tended to respond less to situations of high uncertainty (Aastveit, Natvik, & Sola, 2017). Furthermore, this economic theory has been implemented to understand the oil supply-based drivers of the energy market and their development. This economic theory enhanced the understanding of and provided novel insights into natural resources, environmental problems and policy-based uncertainties. This theoretical approach is already utilized by business scholars to understand the necessity of energy resources for economic production and growth. North (2016) studied this economic theory by considering economic history and institutional change. He stated that human institutions and organizational structures are influenced by societal and economic outcomes (North, 2016).

To understand the relationship between OSS and the EPU, Mobeen Ur Rehman critically inspected the role of OS on the occurrence of uncertainty in a developing state. She generated a structural VAR framework that specifically considered aggregate demand shocks, OSS, and other shocks specific to the demand for oil. Mobeen Ur Rehman modeled the non-linear outcomes of uncertainty using the framework of regime switching, and it was concluded that economic policy-based risk factors in Japanese, Spanish and Indian activities have a direct impact on the global OPS. Oil-based demand shocks are advantageous for India and China (Rehman, 2018). Wensheng Kang and others considered the positive innovations in UK oil production that are linked to the reduction of uncertainties in American economic policies. According to this study, the causes of OSS are linked to a 21% variation in economic policy-based uncertainty in American states. In addition to this, they also forecasted the United States' (US) oil production based on the effects on interquartile ranges of government expenditure and American Consumer Price Index (CPI). They concluded that the increased shock to US oil supply and its destruction enhanced the uncertainty of expenditure forecasting and the CPI of the US. This shows that a 21% variation occurred as a result of the shock to the US' oil supply and the appropriate CPI (Kang, Ratti, & Vespignani, 2017). In the Money and Finance journal, scholars have critically studied the demand of oil in order to understand its productive impact on the rate of return of operating activities (Hoque, Soo, & Zaidi, 2019; You, Guo, Zhu, & Tang, 2017). According to this study, the return rate of a company is adversely affected due to the uncertainty factor of outside policies. These researchers studied the impact of OS on stock returns that are heightened by policy uncertainties, concluding that a heterogeneous response rate occurs in downstream, upstream and midstream companies (Kang, de Gracia, & Ratti, 2017). In the same year, Wanhai You and others stated that OPS have a direct impact on the overall uncertainty of economic activities in China. They also stated that heterogeneous-based outcomes are generated through quantile regression. In other words, if the EPU increases, a stock return will decrease, as oil price changes have an asymmetric influence on stock returns (You et al., 2017). Similar research was conducted by Yanfeng Wei in their research journal, in which they conducted a quantitative structural analysis on tested variables, using China as a case study. According to this study, EPU and oil supply significantly reduces the real export rate, whereas the aggregate oil demand and shocks significantly enhance the real output. They concluded that EPU-based shocks play a major role in accounting for trade, import and export-based variance within the state of China (Wei, 2019).

In the Energy journal, research by Wang and Sun (2017) used structural equation modeling to critically evaluate the energy price of a state (Degiannakis, Filis, & Panagiotakopoulou, 2018). According to this study, oil demand was unyielding in terms of overall oil price change within a certain time frame, and it was concluded that economic activity plays a major role in oil price changes within a state. Furthermore, political tensions and wars usually indirectly impact oil prices, which directly impacts the value of a state's currency

(Chen, Jin, Ouyang, Ouyang, & Wen, 2019; Kang, de Gracia, et al., 2017). This significant research critically inspected the fluctuation of oil prices due to changes in customer demand and its influence on overall economic progress (EP) (Wang & Sun, 2017). After this research, Abebe Hailemarian and others estimated the volatility of oil prices and their impact on EPU by considering time-varying coefficients (Chen, Sun, & Wang, 2019; Olanipekun, Olasehinde-Williams, & Saint Akadiri, 2019). They found both state-specific and common trends, stating that oil prices have a time-varying influence on EPU. According to this study, an increase in oil price causes lower levels of uncertainty in economic policy (Hailemariam et al., 2019). According to Yang (2019), there are crude oil prices that increase EPU within the US in the long-term. According to this study, this particular relationship is directly affected by time scale changes, and it decreases with time (Yang, 2019). This research considered the causal relationship between the intensification of oil price shocks and EPU. Cem Isik and others have stated that the EG outlook is more uncertain in terms of governmental economic policies. According to these researchers, the travel plans of consumers could be postponed due to an increase in state-wide uncertainty. In their research, they used an EPU index to effectively predict the amount of international tourists arriving in the US from Canada and Mexico. They ultimately concluded that an increase in the EPU index causes a decrease in the demand for tourism within a state. As Canadian tourists seemed to be more sensitive to this EPU index, a major change was seen in holidays from Canada to the United States, in comparison to Mexico (Işık, Sirakaya-Turk, & Ongan, 2019). In addition, further important research conducted by Mohammad Enamul Hoque and his research partners examined the influence of global EPU, geopolitical risk, and the OPS on the fluctuation of stock prices in Malaysia using an augmented SVAR approach. According to their outcomes, geopolitical risk significantly influences the stock market and indirectly impacts OS channels and GPU (Hoque et al., 2019).

Therefore, the present study poses the following hypotheses:

H 1: Oil supply shocks have a significant impact on the uncertainty of economic policy.

H 2: The global demand of oil shocks has a significant impact on the uncertainty of economic policy.

3. Methods and Material

This section of the study includes information about the detailed methodology of the study, including data collection and a description of the unit root (UR) test and other tests that were employed by the researcher.

The motive behind the current research was to explore and analyze the impact caused by OPS in Australia on EPU. In order to do so, OPS have been divided into two categories: OSS and OS caused by GD. In addition, a control variable, geopolitical risk, was also considered by the researcher. Data regarding OSS and OS due to GD were taken from the Australian Institute of Petroleum, and data on EPU was collected from the website of policy uncertainty. The remaining data required for the current study was collected from other reliable and accurate databases, such as the World Bank Development Indicators. The data collected covers a total time period of 28 years.

It was crucial to study the behaviors presented in the collected data was crucial before different techniques and tools were employed. It must be noted that the data trends are significant, and they must be considered. It has been observed that the data might include certain data trends, which indicate the presence of a UR in the data. This UR might result in the non-stationary state of the collected data, which will ultimately provide inaccurate and unreliable results that must be avoided. In addition, the current study involves a VAR estimation technique, and one of the requirements of this technique is that the data on which it is being applied must be free of trends and URs, which is why the researcher employed UR tests (Said & Dickey, 1984). Two types of UR tests were used: The Augmented Dickey Fuller (ADF) and the Philip Perron (PP) test. Not only did these tests provide information about the stationary state and presence/absence of the URs in the collected data, they also provided information about the integration order of the variables on which data had been collected.

As previously discussed, the researcher has used a VAR estimation approach in the current study to observe the impact of OPS on EPU in Australia. The aforementioned approach was made popular when used in previous research to study macroeconomic factors (Sims, 1980). In a similar fashion, this technique has also been useful to study time series data economically (Lütkepohl, 2005). In this approach, two aspects are generally studied—impulse response function and variance decomposition. The analyst observed that these aspects are very much in accordance with the motives of the current study and, therefore, they could be used effectively. In the event of impulsive responses, a change in the dependent variable due to a change in the independent variable could be observed through the impulse response figures. These responses can be changed into quantitative data through variance decomposition, which is another aspect of VAR. The VAR model was applied using the following equation:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_k Y_{t-k} + \mu_t$$

In this equation, Y_t denotes the dependent variables, A represents the coefficients of the variables, while μ_t is showing the error term. An important aspect of the VAR model that must be noted is that all the variables of the study are taken as endogenous and they face regression based on their own lagged values. Based on the study's two independent variables, the following two models can be generated:

Model 1: Yt= [OSS, EPU$_t$]

Model 2: $Yt = [OSG_t, EPU_t]$

In these equations, OSS represents oil supply shocks, OSG represents oil shocks due to global demand and EPU represents uncertainty in economic policy.

The researcher used five lags in view of the optimal lag length in the current research. Some diagnostic tests were also employed by the researcher, such as an autocorrelation test and a heterscedasticity test, so that basic information about the collected data collected could be obtained. Furthermore, the model stability test was also applied using the roots of the characteristic polynomial. All of these tests were applied in order to ensure the eligibility of the collected data.

4. Results Estimation

The first test used by the researcher in the current study was the UR test—the aim of which was to explore the stationary and stochastic properties of the data. In this regard, two different techniques were used: ADF and PP tests. The results of these two tests are presented in Tables 1 and Table 2, respectively. In Table 1, the results of the ADF unit root test indicate that, in the level series, some of the variables rejected the null hypothesis of UR presence and the non-stationary of the data. The first difference technique was used by the researcher to resolve this issue and it can be seen in the results that, after the first difference, all the variables rejected the null hypothesis of UR. This indicates that, at the level series, the data is non-stationary, whereas, at the first difference series, the collected data has become stationary. Similarly, in Table 2, the results of the PP test showed that not all the variables rejected the null hypothesis in the level section; however, all of them rejected it in the first difference section. Therefore, it can be stated that both the UR tests provided similar results that suggest the variables of the study have a mixed order of integration, i.e. zero and the first order of integration.

Table-1. ADF UR test.

Constructs	Level		1st Difference	
	Constant	Constant+ Trend	Constant	Constant+ Trend
EPU	-4.2644	-3.6253*	-7.6143*	-7.1186***
OSS	-3.2743*	-4.7364*	-9.3254***	-9.8316***
OSG	-6.6523*	-5.7264*	-8.1432**	-8.7135***
GPR	-4.7136	-2.5134	-5.9913*	-7.1763***

Table-2. PP UR test.

Constructs	Level		1st Difference	
	Constant	Constant+ Trend	Constant	Constant+ Trend
EPU	-2.7264	-4.2753*	-5.7363*	-6.1653***
OSS	-1.2635*	-5.7235*	-7.7235***	-11.2467***
OSG	-4.3674*	-6.6235*	-6.5134**	-4.1635***
GPR	-2.2554	-3.2356	-3.0816*	-9.7423***

After the UR tests, the researcher applied the autocorrelation LM test and the heteroscedasticity test—which are important diagnostic tests—with the aim of finding out whether or not there is any autocorrelation or heteroscedasticity among the variables. This was a necessary step, as the VAR model requires certain prerequisites and diagnostic checks. The results of these two tests can be viewed in Tables 2 and 3, respectively. According to Table 3, the results of the autocorrelation test clearly indicate that both of the models developed by the researcher did not reject the null hypothesis of autocorrelation in any of the selected lags. This is clear from the fact that the p values in all cases are greater than 0.05. Similarly, as seen in Table 4, the results of the heteroscedasticity test do not indicate the rejection of a null hypothesis in either model. This leads to the ultimate conclusion that there is no autocorrelation or heteroscedasticity in the study's variables. Therefore, the data was confirmed as being eligible for the study's VAR model.

Table-3. Autocorrelation LM test.

	Model 1		Model 2	
Lags	LM Stat	Prob	LM Stat	Prob
1	45.72533	0.7352	43.81632	0.6234
2	56.61532	0.7326	54.61358	0.4713
3	34.15382	0.6353	32.82453	0.8652
4	57.01373	0.2363	55.17354	0.2743
5	40.71537	0.1863	38.23643	0.0836

Table-4. Heteroskedasticity test.

Joint Test	Model 1	Model 2
Chi Sq	1254.753	1243.624
Df	1260	1260
Prob	0.2725	0.2423

The impulse response of EPU to OSS has been presented in Figure 1. In this figure, the red dotted lines indicate the critical range and the blue dotted line indicates the reaction of EPU. It is clear from this figure that the actual range is within the critical range. In addition, the results of the variance decomposition are presented in Table 5. The variance decomposition results indicate that the maximum variance caused by OSS in EPU is 41.82. This maximum variance was achieved in the tenth quarter, showing that the OSS had a significant variance impact on EPU in the tenth quarter of the data.

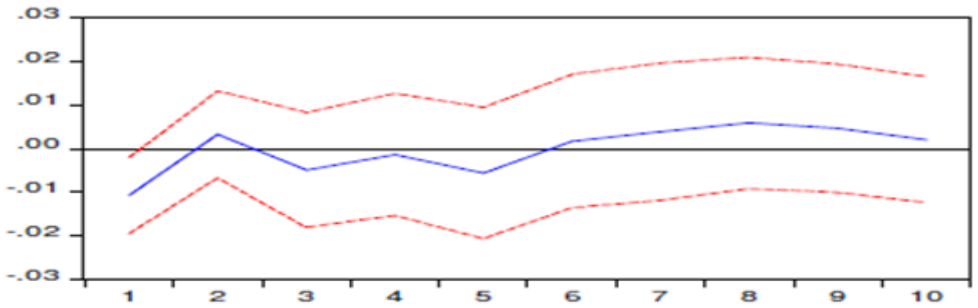

Figure-1. Response of EPU to OSS.

Table-5. Variance Decomposition Model 1.

Variable	Period	OSS	EPU
EPU	1	22.73	62.71
	4	35.54	63.62
	8	36.62	52.51
	10	41.82	51.77

The impulse response of EPU to OS due to GD is presented in Figure 2. In this figure, the red dotted lines show the critical range and the blue dotted line shows the reaction of EPU. It is evident from the figure that the actual range is present within the critical range. In addition, the results of the variance decomposition presented in the Table 6 show that the maximum variance caused by OS due to GD in EPU is 64.97. This maximum variance has been achieved in the tenth quarter, highlighting that OS due to GD had a significant variance impact on EPU in the tenth quarter of the data.

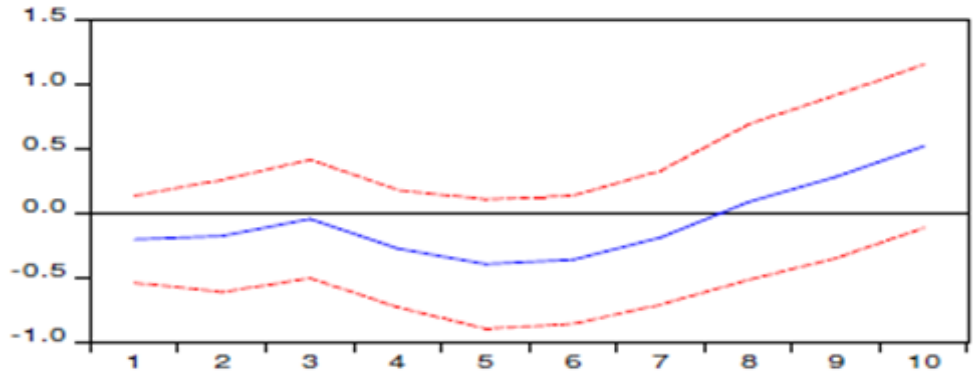

Figure-2. Response of EPU to OSG.

Table-6. Variance Decomposition Model 2.

Variable	Period	OSG	EPU
EPU	1	25.72	72.51
	4	16.63	62.43
	8	43.53	54.72
	10	64.97	65.99

5. Discussion and Conclusion

The aim of this study was to find out how EPU is impacted by OPS in Australia. In order to do so, two categories of OPS were considered: OSS and OS due to GD. The data was collected from relevant Australian sources and databases, and the researcher applied different techniques and tests on the data—the most important and fundamental of which was the VAR model. The results suggest that OSS and OS due to GD both have a significant and positive impact on EPU in Australia (Aloui, Gupta, & Miller, 2016; Hoque et al., 2019). This could be due to the fact that, even though there are certain fluctuations in oil prices, the market has the potential to adjust. However, it is important to note that this positive impact is not consistent; in the short-term, the impact may remain positive for a certain period of time until it gradually changes into a negative impact. As a result, in the medium-term, OS are found to have a negative and significant impact on EPU. The period between the positive and negative impact can be considered as a situation in which there are changes and shocks in the oil prices, but they become stable over time and policymakers have the capability to deal with such shocks. In the long-term, this impact becomes positive and significant once again (Mei, Zeng, Cao, & Diao, 2019). This can be understood as a situation in which there are frequent changes and shocks to oil prices and, based on these shocks, investors make investment decisions rationally. They may choose to reduce or alter their investments, which could ultimately impact the economy and economic policy, potentially causing many uncertainties. In addition, an increase in oil prices could have a psychological impact on policymakers, who may feel stressed because of this situation, which could also impact EPU (Gao, Ren, & Li, 2019). Geopolitical risk may also play a role, which is why it has been considered as the control variable of the study.

The results of the current study, which were obtained through the application of a VAR model on the collected data, indicate the fact that the impact of OPS on EPU varies depending on the time period. In the short-term, the impact is positive and significant. In the medium-term, the impact of OPS become negative; however, in the long-term, the impact once again becomes positive and significant. Thus, on the basis of these results, it can be concluded that the government of Australia must have consistent policies in order to cope with OPS and geopolitical risks. Policymakers have a significant role, as they must create advantageous policies and regulations that positively influence the economy of the country.

This study may have practical implications for the government and policymakers in Australia, as they may require assistance when devising consistent policies to cope with OPS and geopolitical risks. In addition, other researchers might find this study useful, as they can access the literature about the impact of OPS on EPU to use in their own research studies. It is recommended that future researchers bring certain innovations and improvements to the study, such as increasing the sample size to get better results. Future researchers could also consider countries other than Australia, as well as other dimensions associated with OPS, in order for a broader scope of results to be achieved.

References

Aastveit, K. A., Natvik, G. J., & Sola, S. (2017). Economic uncertainty and the influence of monetary policy. *Journal of International Money and Finance*, *76*, 50-67.

Albulescu, C. (2020). Do COVID-19 and crude oil prices drive the US EPU? *arXiv preprint arXiv:2003.07591*.

Aloui, R., Gupta, R., & Miller, S. M. (2016). Uncertainty and crude oil returns. *Energy Economics*, *55*, 92-100.Available at: https://doi.org/10.1016/j.eneco.2016.01.012.

Chen, X., Sun, X., & Wang, J. (2019). Dynamic spillover effect between oil prices and EPU in BRIC countries: A wavelet-based approach. *Emerging Markets Finance and Trade*, *55*(12), 2703-2717.Available at: https://doi.org/10.1080/1540496x.2018.1564904.

Chen., J., Jin, F., Ouyang, G., Ouyang, J., & Wen, F. (2019). Oil price shocks, EPU and industrial economic growth in China. *PloS one*, *14*(5), e0215397.Available at: https://doi.org/10.1371/journal.pone.0215397.

Degiannakis, S., Filis, G., & Panagiotakopoulou, S. (2018). Oil price shocks and uncertainty: How stable is their relationship over time? *Economic Modelling*, *72*, 42-53.Available at: https://doi.org/10.1016/j.econmod.2018.01.004.

Gao, X., Ren, Y., & Li, X. (2019). The interdependence of global oil price, China's stock price and EPU. *Australian Economic Papers*, *58*(4), 398-415.Available at: https://doi.org/10.1111/1467-8454.12160.

Hailemariam, A., Smyth, R., & Zhang, X. (2019). Oil prices and EPU: Evidence from a nonparametric panel data model. *Energy Economics*, *83*, 40-51.Available at: https://doi.org/10.1016/j.eneco.2019.06.010.

Hoque, M. E., Soo, W. L., & Zaidi, M. A. S. (2019). Oil price shocks, global EPU, geopolitical risk, and stock price in Malaysia: Factor augmented VAR approach. *Economic research-Ekonomska istraživanja*, *32*(1), 3700-3732.Available at: https://doi.org/10.1080/1331677x.2019.1675078.

Işık, C., Sirakaya-Turk, E., & Ongan, S. (2019). Testing the efficacy of the EPU index on tourism demand in USMCA: Theory and evidence. *Tourism Economics*, 1354816619888346.Available at: https://doi.org/10.1177/1354816619888346.

Kang, W., de Gracia, F. P., & Ratti, R. A. (2017). Oil price shocks, policy uncertainty, and stock returns of oil and gas corporations. *Journal of International Money and Finance*, *70*, 344-359.Available at: https://doi.org/10.1016/j.jimonfin.2016.10.003.

Kang, W., Ratti, R. A., & Vespignani, J. L. (2017). Oil price shocks and policy uncertainty: New evidence on the effects of US and non-US oil production. *Energy Economics*, *66*, 536-546.Available at: https://doi.org/10.1016/j.eneco.2017.01.027.

Lütkepohl, H. (2005). *New introduction to multiple time series analysis*: Springer Science & Business Media.

Mei, D., Zeng, Q., Cao, X., & Diao, X. (2019). Uncertainty and oil volatility: New evidence. *Physica A: Statistical Mechanics and its Applications*, *525*, 155-163.Available at: https://doi.org/10.1016/j.physa.2019.03.043.

North, D. C. (2016). Institutions and economic theory. *The American Economist*, *61*(1), 72-76.Available at: https://doi.org/10.1177%2F0569434516630194.

O'Mahony, B., & Lobo, A. (2017). The organic industry in Australia: Current and future trends. *Land Use Policy*, *66*, 331-339.Available at: https://doi.org/10.1016/j.landusepol.2017.04.050.

Olanipekun, I., Olasehinde-Williams, G., & Saint Akadiri, S. (2019). Gasoline prices and EPU: What causes what, and why does it matter? Evidence from 18 selected countries. *Environmental Science and Pollution Research*, *26*(15), 15187-15193.Available at: https://doi.org/10.1007/s11356-019-04949-x.

Rehman, M. U. (2018). Do oil shocks predict EPU? *Physica A: Statistical Mechanics and its Applications*, *498*, 123-136.Available at: https://doi.org/10.1016/j.physa.2017.12.133.

Said, S. E., & Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika*, *71*(3), 599-607.Available at: https://doi.org/10.1093/biomet/71.3.599.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica: Journal of the Econometric Society*, 1-48.Available at: 10.2307/1912017.

Tsui, W. H. K., & Balli, F. (2017). International arrivals forecasting for Australian airports and the impact of tourism marketing expenditure. *Tourism Economics*, *23*(2), 403-428.Available at: https://doi.org/10.5367/te.2015.0507.

Ville, S., Wicken, O., & Dean, J. (2019). Dynamic paths of innovation in natural resource industries in Australia and Norway since world war two. *Scandinavian Economic History Review*, *67*(1), 90-109.Available at: https://doi.org/10.1080/03585522.2018.1530136.

Wang, Q., & Sun, X. (2017). Crude oil price: Demand, supply, economic activity, EPU and wars–from the perspective of structural equation modelling (SEM). *Energy*, *133*, 483-490.Available at: https://doi.org/10.1016/j.energy.2017.05.147.

Wei, Y. (2019). Oil price shocks, EPU and China's trade: A quantitative structural analysis. *The North American Journal of Economics and Finance*, *48*, 20-31.Available at: https://doi.org/10.1016/j.najef.2018.08.016.

Yang, L. (2019). Connectedness of EPU and oil price shocks in a time domain perspective. *Energy Economics*, *80*, 219-233.Available at: https://doi.org/10.1016/j.eneco.2019.01.006.

You, W., Guo, Y., Zhu, H., & Tang, Y. (2017). Oil price shocks, EPU and industry stock returns in China: Asymmetric effects with quantile regression. *Energy Economics*, *68*, 1-18.Available at: https://doi.org/10.1016/j.eneco.2017.09.007.

Zeng, Z., Kang, R., Wen, M., & Zio, E. (2018). Uncertainty theory as a basis for belief reliability. *Information Sciences*, *429*, 26-36.Available at: https://doi.org/10.1016/j.ins.2017.10.050.