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Article

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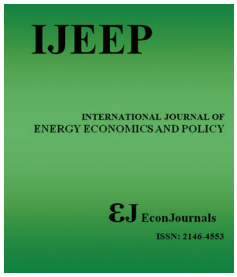
International Journal of Energy Economics and Policy (IJEEP)

Reference: Wiryono, Sudarso Kaderi/Sudrajad, Oktofa Yudha et. al. (2020). Do oil price shocks give impact on financial performance of manufacturing sectors in Indonesia?. In: International Journal of Energy Economics and Policy 10 (5), S. 510 - 514. https://www.econjournals.com/index.php/ijeep/article/download/9808/5313. doi:10.32479/ijeep.9808.



International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2020, 10(5), 510-514.

Do Oil Price Shocks Give Impact on Financial Performance of Manufacturing Sectors in Indonesia?

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Received: 21 April 2020 **Accepted:** 15 July 2020 **DOI:** https://doi.org/10.32479/ijeep.9808

ABSTRACT

The panel vector auto regression model is estimated using three main variables related to with profitability, financial liquidity, and financial leverage for 94 manufacturing companies from 2000 to 2017 in Indonesia. The aim is to examine the impact of oil price shocks on the ROA (profitability), CR (financial liquidity), and DER (financial leverage). The impulse reaction function of samples reveals some remarkable results. First, the response of ROA, DER, and CR appears to be consistent in many ways. Second, either Brent oil or WTI oil gives the same result for these variables. Third, financial liquidity for Indonesia manufacturing companies is not affected by the oil prices. The results obtained are robust following the GMM model in the estimation of the panel VAR.

Keywords: Oil price shocks, Panel VAR, Impulse reaction function, GMM model
JEL Classifications: L6, Q4

1. INTRODUCTION

The manufacturing sector is one of the initiators of economic growth for each country. National Development Planning Agency (2019) in Indonesia has stated that Manufacturing is a prerequisite for raising economic growth. While oil fluctuations have statistically significant effects on the economy, particularly in the developed market. Moreover, economic theory suggests that uncertainty about oil price shocks may have a negative impact on real economic activity. Elder and Serletis (2010) stated that the effects of oil price shocks tend to magnify the negative response to economic activity. However, it is surprising that there is still little empiric consensus on the impact of oil price shocks on the financial performance of manufacturing companies in Indonesia as a developing market. The focus on the Indonesian manufacturing sector is for some reasons. First, the Ministry of Industry of the Republic of Indonesia has stated that, at present, the manufacturing sector can contribute 20% to the national Gross Domestic Product (GDP). Second, Indonesia has unique characteristics as an emerging market and an importing country that the manufacturing sector needs to be analyzed. Third, there is still no research on oil price shocks and financial performance in Indonesia.

This study estimates a panel vector autoregression model using three main variables related with the financial performance of the company, namely profitability, financial liquidity, and financial leverage for 94 manufacturing companies from 2000 to 2017 in Indonesia. The best advantage of why we use panel VAR is that multiple variables can be simultaneous as endogenous, allowing for endogenous interaction between oil prices either from Brent or WTI, return on asset (ROA), current ratio (CR), and debt equity ratio (DER) in our case. We find ample evidence of oil price shocks on the financial performance of manufacturing companies. First, the response of ROA, DER, and CR appears to be consistent in many ways. Second, either Brent oil or WTI oil gives the same result for these variables. Third, the current ratio as financial liquidity ratio for manufacturing companies in Indonesia is not affected by the oil prices. Fourth, we add a literature review by finding the response between oil price shocks and financial performance for manufacturing companies in Indonesia.

The rest of the paper is organized as follows. Section 2 presents a review of literature. Section 3 sets out the data and methodology. The empiric results are described in Section 4, and Section 4 concludes.

2. LITERATURE REVIEW

Many researchers (Rahmanto et al., 2016; Cong et al., 2008; Eksi and Senturk, 2012) focus on the nexus between oil price shocks and stock indices. In Indonesia, Rahmanto et al. (2016) examined the short-term responses of Indonesian sector indices to oil price shocks. They have found that the effects are positive and significant for the return of stocks to agriculture and the consumer goods sector. This research did not consider the manufacturing sector that might be associated with oil price shocks. While in China, as the world's largest emerging market, Cong et al. (2008) have already stated that by using the VAR model, oil price shocks have not had a significant impact on many sectors except manufacturing and oil industries. Eksi and Senturk (2012) assessed the oil price shocks in the indices of seven Turkish manufacturing subsectors. This research has shown that subsectors such as chemical petroleum, plastics and basic metals are highly sensitive to oil price shocks. Based on these previous studies, we have tried to examine in depth the impact of oil price shocks on manufacturing companies in Indonesia from different perspectives, i.e. their financial performance. Aye et al. (2014) investigated the impact of oil price shocks on manufacturing production in South Africa. They found that the oil price shocks had a negative and significant impact on the production of South Africa. They found that the oil price shocks had a negative and significant impact on the production of South Africa. The response may be either positive or negative. In Norway and the United Kingdom, Bjørnland (1997) argued that oil price shocks could stimulate the economy, including the manufacturing sector. While in the US, using real options, Elder and Serletis (2011) reported a crisis moment in 2008-2009, oil price shocks appeared to be caused by the production of durable goods, namely automobiles and other transport equipment. Guerrero-Escobar et al. (2017) concluded that oil supply shocks can be achieved in both advanced and emerging markets, but these effects are small and less persistent. In Greece, Drakos and Konstantinou (2013) found that oil price shocks reduced investment decisions, including investment in the manufacturing sector. The impact of oil price shocks also varies between the oil exporter and the oil importer. Using a comparative analysis of Brazil, Russia, India, China, and South Africa, Nasir et al. (2018) argued that oil exporters tend to be more strongly influenced by oil price shocks, while oil importer countries are more vulnerable to oil price shocks. For the UK manufacturing and service sector, Guidi (2009) concluded that the IRF (impulse reaction functions) shows that oil price shocks have had positive effects on the manufacturing and service sectors. While the manufacturing sector is more affected by oil price shocks than by the services sector. In Arab Saudi Arabia, Mahboub and Ahmed (2017) conducted research on the impact of oil price shocks on the manufacturing sector. They concluded that there is no long-term effect of oil price shocks on the manufacturing sector. Based on what previous research has done, this research seeks to fill the gap-related to the nexus on oil price shocks and financial performance in the Indonesian manufacturing sector.

3. DATA AND METHODOLOGY

In order to investigate the nexus between oil price and financial performance for manufacturing companies, we estimate the following PVAR in equation 1:

$$X_{it}=A(L)Xit-1+\mu+\varepsilon_{it} \quad (1)$$

where X_{it} is a vector of endogenous variables, $A(L)$ is a matrix polynomial in the lag operator, and μ_i is a vector of company-specific effects. X_{it} comprises of the growth rate (log-differences) of the following four endogenous variables: Oil price (brent oil or WTI oil), return on assets (ROA), current ratio (CR), and debt equity ratio (DER). Table 1 presents the summary of main variables Lastly, ε_{it} represents a vector of idiosyncratic errors.

This research uses forward-mean differencing or orthogonal deviations (the Helmert procedure), following Love and Zicchino (2006) instead of the fixed-effects estimator. The transformation maintains homoscedasticity and does not make serial correlation since each observation is weighted in order to standardize the variance(Arellano and Bover, 1995). Furthermore, this method estimates the coefficients by the generalized method of moment (GMM) by using the lagged values of regressors as instruments. The impulse-response functions (IRFs) are computed from the estimated PVAR given in equation above. We use Monte Carlo simulations to construct the confidence intervals of the IRFs. The computation of IRFs needs imposing a set of identifying restrictions which makes the order of the variables in Xit key for the estimation of a PVAR. The dataset comprises of an unbalanced panel data for 94 companies over the period 2000-2017. Table 2 shows us the data collection process. While Table 3 presents the summary statistics.

Table 1: Summary of main variables

Variables	Description	Sources
WTI and Brent oil	West Texas intermediate and Brent oil as a benchmark in oil pricing in the world	Wikipedia
ROA	Return on assets (ROA) as profitability ratio for the firm. To make understanding of how profitable a firm is relative to total assets	Hamilton (2003)
CR	Current assets (CR) as one of financial liquidity ratios for the firm. To assess a firm's ability to pay off its short -term liabilities	Investopedia
DER	Debt equity ratio (DER) as financial leverage ratio for the firm. To assess the degree to which a firm is financing its operation through debt	Investopedia

Table 2: Data sample collection process

Step	Restrictions	Companies
1	Basic industry and chemicals consist of cement, ceramics, glass, porcelain, meta and allied products, chemicals, plastics and packaging, animal feed, wood industries, pulp and paper. Miscellaneous industries consist of machinery and heavy equipment, automotive and component, textile and garment, footwear, cable, and electronics	140
2	Incomplete data of ROA, DER, and CR, remove 46 companies	94

4. EMPIRICAL RESULTS

Table 3 provides summary statistics of all variables under the study of the Panel VAR model over the period 2000-2017.

Table 3: Summary statistics

Variable	Obs	Mean	Std. Dev	Min.	Max.
ROA	1.786	4.568134	20.0732	–144.043	468.9844
DER	1.786	4.546941	60.398	–218.515	1744.894
CR	1.786	2.60225	12.798	0.04074	464.9844
Brent_Oil	1.786	62.5606	-0.57291	18.4533	112.2567
WTI_Oil	1.786	60.0436	0.58476	19.6383	98.5833

Table 2 shows us the number of observations, standard deviation, minimum, and maximum of our variables in this research. The results demonstrate that the means of all variables are not 0 (zero). Moreover, the sample standard deviations lie in the range of –0.57291 and 60.398, indicating the Brent oil is the least volatile variable while debt equity ratio (DER) is the most volatile.

Since, the main of this research is to examine the response of profitability, liquidity, and financial leverage to oil price shocks in manufacturing companies in Indonesia Figures 1 and 2 show the impulse reaction function (IRF) obtained from the estimated

Figure 1: Orthogonalized impulse response function computed from estimated PVAR period 2000-2017 _Brent Oil

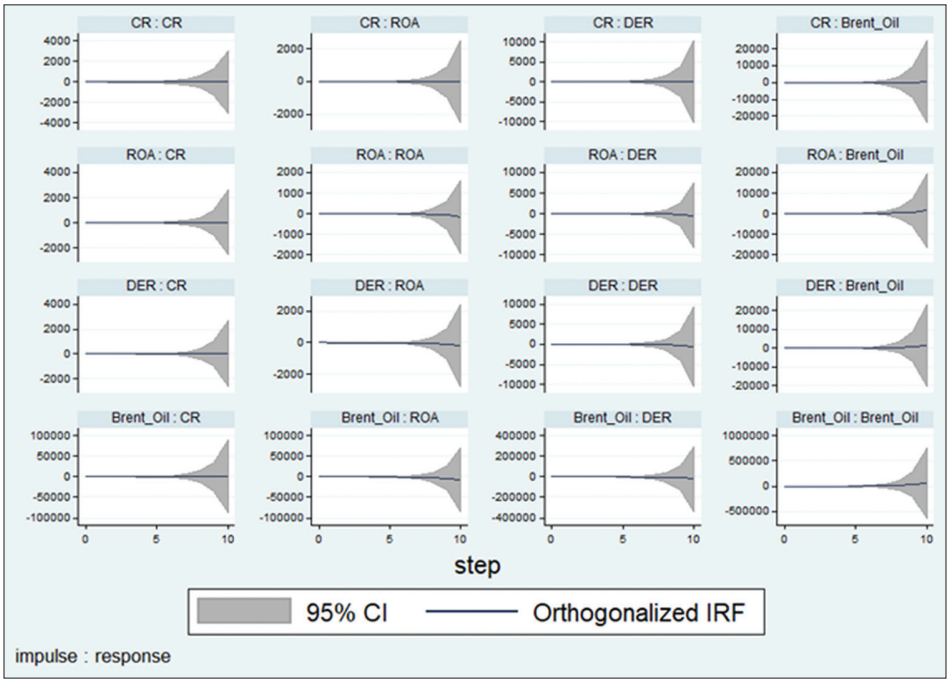

Figure 2: Orthogonalized impulse response function computed from estimated PVAR period 2000-2017 _WTI oil

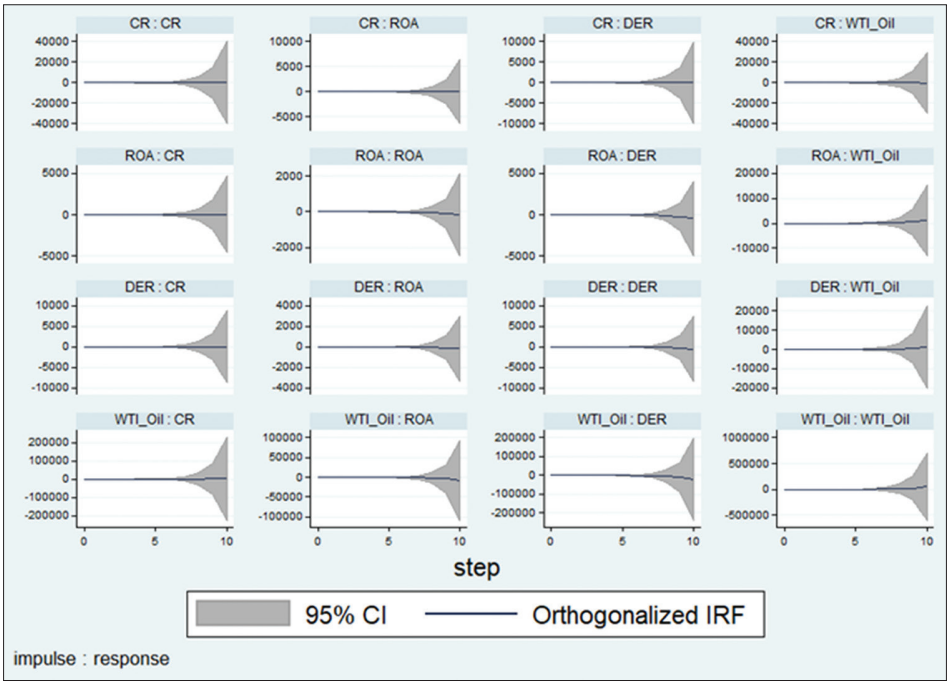

Table 4: Panel vector autoregression_brent oil

Brent_Oil	Coef.	Std. Err.	z	P>z
Brent_Oil				
L1.	2.080465	0.397995	5.23	0***
DER				
L1.	0.046057	0.0195917	2.35	0.019**
ROA				
L1.	0.128386	0.0682323	1.88	0.06*
CR				
L1.	0.0279555	0.2189591	0.13	0.898
DER	**Coef.**	**Std. Err.**	**z**	**P>z**
Brent_Oil				
L1.	–0.7331775	0.4271116	–1.72	0.086*
DER				
L1.	–0.0971954	0.0784393	–1.24	0.215
ROA				
L1.	–0.174396	0.224606	–0.78	0.437
CR				
L1.	–0.036616	0.1079885	–0.34	0.735
ROA	**Coef.**	**Std. Err.**	**z**	**P>z**
Brent_Oil				
L1.	–0.2113405	0.1360439	–1.55	0.12
DER				
L1.	–0.0103912	0.0054722	–1.9	0.058*
ROA				
L1.	0.0646936	0.1167355	0.55	0.579
CR				
L1.	–0.0169424	0.0375299	–0.45	0.652
CR	**Coef.**	**Std. Err.**	**z**	**P>z**
Brent_Oil				
L1.	0.038752	0.2223883	0.17	0.862
DER				
L1.	0.0014443	0.0085782	0.17	0.866
ROA				
L1.	–0.0017998	0.019546	–0.09	0.927
CR				
L1.	0.5039416	0.6326065	0.8	0.426

Table 5: Panel vector autoregression_WTI oil

WTI_Oil	Coef.	Std. Err.	z	P>z
WTI_Oil				
L1.	2.088106	0.4197686	4.97	0***
DER				
L1.	0.0393477	0.0170258	2.31	0.021**
ROA				
L1.	0.1033453	0.0601537	1.72	0.086*
CR				
L1.	–0.0124615	0.1710751	–0.07	0.942
DER	**Coef.**	**Std. Err.**	**z**	**P>z**
WTI_Oil				
L1.	–0.7962892	0.4885709	–1.63	0.103
DER				
L1.	–0.0943286	0.0771453	–1.22	0.221
ROA				
L1.	–0.1640949	0.2244041	–0.73	0.465
CR				
L1.	–0.0139324	0.0864033	–0.16	0.872
ROA	**Coef.**	**Std. Err.**	**z**	**P>z**
WTI_Oil				
L1.	–0.2759592	0.1593985	–1.73	0.083*
DER				
L1.	–0.0110096	0.0053442	–2.06	0.039**
ROA				
L1.	0.0671679	0.1180363	0.57	0.569
CR				
L1.	–0.0094921	0.0348345	–0.27	0.785
CR	**Coef.**	**Std. Err.**	**z**	**P>z**
WTI_Oil				
L1.	0.0266974	0.2549988	0.1	0.917
DER				
L1.	0.0008138	0.0081255	0.1	0.92
ROA				
L1.	–0.0025084	0.0166131	–0.15	0.88
CR				
L1.	0.5030449	0.6252101	0.8	0.421

PVAR. IRF is a useful graph to understand how one standard deviation of shock or innovation of a variable will affect another variable and how it is developed over time. Our IRF shows us that there is no variation of response of each financial performance while there is a fluctuation from oil price either from Brent or WTI. The same response from ROA, CR, and DER comes after more than 5 years. We use 95% confidence interval with 1000 simulations from Monte Carlo.

Tables 4 and 5 show us the result from panel autoregression using GMM estimation. When we concern to use Brent Oil as a variable for the oil price, the financial performance variable that gives us a significance result is debt-equity ratio. The debt equity ratio is measured by financial leverage of the company. But the different result comes from WTI Oil as a variable for the oil price, the financial performance that gives us significance result is a return on asset (ROA). This gives us insight that first, Brent oil and WTI Oil can give us different result although their fluctuation is similar. Second, liquidity such as the current ratio doesn't depend on oil prices in any perspective either from Brent oil or WTI oil.

5. CONCLUSION

The PVAR model is estimated using data from 94 manufacturing companies between 2000 and 2017 to identify the dynamic relationship between oil prices and financial performance for Indonesian manufacturing companies. Oil price shocks do not appear to have an impact on the financial performance of Indonesia's manufacturing sectors. It shows that the responses of return on asset (ROA), current ratio (CR) and debt equity ratio (DER) seem consistent in many ways with oil price shocks. The price of oil either from Brent oil or from WTI oil does not give a significant result to the current ratio (CR) or the financial liquidity of manufacturing companies in Indonesia. The impulse reaction function shows that there is no effect at all between oil prices and financial performance in the Indonesian manufacturing sector over the period 2000-2017. It can be concluded that producers in emerging oil importer markets, such as Indonesia, tend to be less vulnerable to oil price shocks. The results are robustly confirmed by the GMM method. Consequently, on the basis of this result, a more in-depth dynamic estimation approach that accounts for other sectors is essential for the determination of the effects of oil prices. These additional factors are potential subjects for future empiric analyzes.

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