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The Influence of Crude Oil Prices Volatility, the Internet and Exchange Rate on the Number of Foreign Tourist Arrivals in Indonesia

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ABSTRACT

This paper seeks to examine the influence of crude oil prices volatility, the internet, and exchange rate on the number of foreign tourist arrivals in Indonesia. Using a time-series dataset from 1995 to 2018 and employing an autoregressive distributed lag (ARDL) model plus an error correction model (ECM-ARDL), our research shows that in the long run, the internet has a positive influence on the number of foreign tourist arrivals. Every 1% rise in the internet, the number of foreign tourist arrivals rises by 0.49%. However, crude oil prices volatility and exchange rates do not significantly affect the number of foreign tourist arrivals. In the short run, there is a negative influence of crude oil price volatility on the number of foreign tourist arrivals. Meanwhile, the exchange rate positively affects the number of foreign tourist arrivals, meaning that the appreciation (depreciation) of the IDR exchange rate against the USD causes the number of foreign tourist arrivals to go down (up).

Keywords: Crude Oil Price Volatility, The Internet, Exchange Rate, Foreign Tourist Arrivals, ARDL Model
JEL Classifications: C32, E310, F310, O330

1. INTRODUCTION

Crude oil is an important commodity in the world economy because crude oil is needed by all countries as input (raw material) in the production process. In this case, it functions to run production machinery, transportation tools, and machine for power generation (Muthalib et al., 2018). The need for crude oil brings world demand shock. This increase in demand can raise crude oil prices. However, the price of crude oil can also fall as a result of economic crisis. Since the beginning of the 21st century, international oil prices have surged and fluctuated widely. Significant changes in oil price have affected many countries (Liu et al., 2020). Changes in the price of crude oil can trigger changes in production cost in industrial sectors including tourism industry. Large oil price changes as a result of rising and falling crude oil prices can make crude oil price volatility high (Becken, 2011). Crude oil price volatility is a measure of risk in crude oil trading and investments in the financial markets where crude oil is the basic benchmark in derivative trading, for instance option instruments (put option and call option). Furthermore, currencies and the internet also play an important role in the economy. Currency becomes a means of transaction in international trade both in real and financial sectors. Meanwhile, the internet is a worldwide communication network that serves to send and transfer information between its users in all economic activities (Saidi et al., 2020) including activities in the tourism industry sector.

With regards to the role of crude oil, currency and the internet in the world economy, the discussion about the relationship between

crude oil prices, crude oil prices volatility, exchange rates, the internet and the number of tourist arrivals have been the concern of academics both from the theoretical side and the empirical side. In theory, crude oil price volatility and exchange rate can influence the number of tourist arrivals through inflation. An increase in oil price volatility can increase the state of uncertainty in economic activity in every country (Yang et al., 2002; Rentschler, 2013). The increase in state of uncertainty can lead to delays in investment by investors and companies that ultimately lower total production (Rafiq et al., 2009; Trang et al., 2017; Eyden et al., 2019). The decline in total production can cause aggregate supply to drop which then raise the price of produced goods (including the price of goods in the tourism industry sector) and inflation (Bulman and Simon, 2003; Dritsakis, 2004; Pangannavar, 2014). So, crude oil price volatility can lead to high inflation (Gokmenoglu and Fazlollahi, 2015; Hung, 2020). Furthermore, exchange rates and the internet can also affect the number of foreign tourist arrivals in a country. Exchange rates can affect the number of foreign tourist arrivals via interest rate channels and inflation. According to the uncovered interest rate parity theory, if the domestic currency exchange rate strengthens (appreciates), then the domestic interest rate can fall (Pilbeam, 2006; Adam et al., 2017; Saenong et al., 2020) which can afterward encourage inflation (Saidi et al., 2019). High inflation can raise travel costs, accommodation, and production prices of the tourism industry which in turn can reduce the number of foreign tourist arrivals in the country of tourist destination (Al-Mulali et al., 2019). Thus, an increase in crude oil price volatility and the domestic currency exchange rate can decrease the number of foreign tourists in a country of tourist destination.

Internet technology can make it easy for potential tourists to get information about interesting tourist attractions to visit. For companies in the field of tourism, internet technology can be used to promote tourism objects in the form of beautiful natural resources and art of local culture. Moreover, from the efficiency side, according to Meltzer (2014), Zengin and Arici (2017) and World Bank (2016), internet use can reduce the operational costs of companies in the field of tourism so that the costs of visiting can also decrease. Knowledge of attractive tourism objects and affordable visit costs can influence the attitude or decision of potential tourists to make a visit to tourist spots. These two potentially raise the number of foreign tourists coming into a country.

A number of empirical studies have been conducted to investigate the influence of oil prices on the number of foreign tourist arrivals (Cao et al., 2017; Hassani et al., 2020). Studies of the influence of oil price volatility on economic activity have also been undertaken (Rafiq et al., 2009; Itō, 2010; Rentschler, 2013; Al-Asasi, 2017; Junior, 2018). Nevertheless, these studies are nowhere near enough (Rafiq and Salim, 2014). According to our best knowledge, no research study has investigated whether or not Crude oil prices volatility could have an impact on the number of foreign tourist arrivals. Furthermore, several studies looking at the effect of exchange rates on foreign tourist arrivals have been carried out (Vita, 2014; Wamboye et al., 2020). They found that there is an exchange rate effect on the number of foreign tourist arrivals. Likewise, studies on the effect of the internet on the number of foreign tourist arrivals have been carried out by, among others, Agiomirgianakis et al. (2018) and the results of their study indicated that there the internet affects the number of foreign tourist arrivals.

In Indonesia, a research concerning the influence of exchange rate on the number of foreign tourists has been conducted by Faidzin and Cahyono (2017). In their study, however, exchange rate was not found to impact the number of foreign tourist arrivals in Indonesia. Meanwhile, the study looking at the internet influence on the number of foreign tourist arrivals in Indonesia has never been reported in the literature. In this study, we use annual time-series data over the period of 1995- 2018. This data period differs from that used by Faidzin and Cahyono (2017), while it worth noticing that variation in data period between two or more studies could lead to a substantial difference in findings (Adam et al., 2015). Indonesia is a developing country where the tourism sector is important to be developed. Since 1978, the Indonesian government has been paying attention to further the tourism industry with the aim of increasing foreign exchange, expanding employment, and promoting Indonesian culture. Various efforts have been made to develop the tourism sector such as promotion, provision of facilities, and improvement of service quality (Soebagyo, 2012). These efforts appear to pay off, making Indonesia a country that has competitiveness in the tourism sector. Indonesia has become one of the tourist destinations in the world and was ranked 70th in 2013 and 42nd in 2017 (Ollivaud and Haxton, 2019). Since crude oil prices, exchange rate and the internet also become factors that can have an impact on how tourism development is directed, the policy for the provision of crude oil for domestic use, domestic currency rates stabilization, and the internet use in the tourism industry should get more attention. To take policy measures, the government certainly needs data and information that can be obtained through surveys or preliminary studies. Therefore, the current study is of great importance to carry out. To fill the lacuna in research as mentioned above, the purpose of this study is to examine the effect of crude oil price volatility, the internet and exchange rate on the number of foreign tourist arrivals in Indonesia. To test this effect, we employ an autoregressive distributed lag (ARDL) model.

2. LITERATURE REVIEW

As stated earlier, the development of tourism industry sector has attracted the attention of researchers and policymakers in many countries including Indonesia. The advances in various sectors of tourism industry such as tourist sites, arts and culture, hospitality, transportation, restaurants, travel agencies, and other services sectors are assumed to have attracted more foreign tourists to visit. As a result, the number of foreign tourist arrivals is growing which ultimately increases the foreign exchange as well as promotes economic growth. For this reason, researchers have studied factors that can influence the number of foreign tourist arrivals including commodity prices such as crude oil and exchange rate (Sabon et al., 2018) and also the internet (Agiomirgianakis et al., 2018). In this section, we review several empirical studies on the effect of oil prices, exchange rate, and the internet on the number of foreign tourist arrivals in several countries.

A few of researchers have described the symmetry and asymmetry effects of oil prices on the number of foreign tourist arrivals as either positive or negative. Yet, from literature research, we have not found any study looking at the effect of crude oil price volatility on the number of foreign tourist arrivals. Huang et al. (2018) in their study in the United States and in several European countries (Austria, Italy, Germany, Greece, the Netherlands, Spain, Portugal, Sweden, and the United Kingdom) found that there is a positive influence of oil prices on the number of tourist arrivals. Their findings were the results of the Convergent Cross Mapping (CCM) tests on monthly data from January 1996 to December 2015. Becken and Lennox (2012) in the conclusion of their study in New Zealand stated that sharp increases in oil prices have a negative influence on the number of tourist arrivals. Al-Mulali et al. (2019) examined the asymmetry effect that oil prices have on the number of foreign tourist arrivals in Malaysia. Their findings showed that in the short run the increase in oil prices negatively affects the number of foreign tourist arrivals.

Meanwhile, the effect of exchange rate on the number of foreign tourist arrivals was investigated by, among others, Othman et al. (2018), Kosnan et al. (2012), Nugroho et al. (2017) and Gibtiah et al. (2018). Othman et al. (2018) used a set of yearly panel data from 149 countries for the period 1995-2012. In addition to the exchange rate as an exogenous variable, they also included other variables such as the country's revenue from tourism and the number of hotel rooms. The gravity model test results indicated that revenue affects the number of demand in foreign tourists, while exchange rate and the amount of hotel room inventory do not show the effect. Kosnan et al. (2012) examined the number of foreign tourist arrivals in Malaysia using panel data from 20 countries and annual time series data from 1998 to 2009. The factors that become the center of attention are distance, cost of living, and exchange rate. The test results using the gravity model showed the distance, living costs, and the exchange rate negatively affect the number of tourists coming to Malaysia. Nugroho et al. (2017) investigated the impact of exchange rates on the demand of foreign tourists in Bali. Using the logistic regression model, their research showed that exchange rate has no significant effect on the number of foreign tourist arrivals in Bali. Gibtiah et al. (2018) examined the influence of exchange rate, living cost, and friendly culture on the number of Japanese tourist arrivals in Palembang Indonesia. They collected data, by interviewing 120 respondents. The structural equation model test results showed a positive effect of the exchange rate and friendly culture on the number of tourist arrivals, whereas the effect of living cost is not found. Tavares and Leitao (2016) investigated the exchange rate influence and income of the country of origin on the number of foreign tourist arrivals in Brazil. The results of the gravity model test indicated that exchange rate and income of the country of origin positively impact the number of foreign tourist arrivals.

Ramos and Rodrigues (2013) studied the influence of the internet, length of stay, living cost in tourism area, and travelling cost to tourism area on the number of foreign tourist arrivals in 18 European countries (Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, and the UK). The test results of panel data against the countries' panel data with time series from 1993 to 2007 showed that all exogenous variables positively affect the number of foreign tourist visiting the countries. Sun et al. (2019) outlooked the internet influence on the number of tourist arrivals in China using the Granger causality analysis and monthly data over the period of January 2011 to April 2017. The test results showed that the internet could increase the number of tourist arrivals.

3. DATA AND METHODOLOGY

3.1. Data

We use annual time series data which include data for crude oil prices, the internet, and the exchange rate for the period from 1995 to 2018. The proxy for crude oil prices is the price of West Texas Intermediate (WTI) crude oil in USD per barrel. The proxy for the internet is internet users, and we use the percentage of internet users per 100 populations for its unit of measurement. The proxy for the exchange rate is IDR/USD in rupiah per USD. The time-series data for WTI crude oil prices are obtained from the EIA website, while for the internet and the exchange rate are sourced from the World Bank website.

3.2. Methodology

We use VOT, OIL, IUS, EXR, and TRA notations to declare crude oil price volatility, crude oil price, the internet, exchange rate, and the number of foreign tourist arrivals respectively. OIL, IUS, EXR, and TRA variables are the logarithmic forms of the corresponding time-series data. VOT volatility variable is a measure of the risk of crude oil prices in the WTI international crude oil trade (see Misra, 2018). VOT time-series data are generated using the GARCH(1.1) model (see Bahmani-Oskooee and Xi, 2015) as follows

$$OIL_t = a + bOIL_{t-1} + u_t$$

$$h_t \left| \Omega_{t-1} \sim iidN(0, h_t) \right.$$

$$h_t = w + du_t^2 + eh_{t-1}$$

where *a, b, w, d*, and *e* are the parameters of the regression equations, and u_t is an error. The h_t variable is the conditional variance of the error u_t against Ω_{t-1} where Ω_{t-1} is the set of events in the form of information at time t-1 with t = 1995, 1996,…, 2018. Furthermore, $VOT_t = \sqrt{h_t}$ is the crude oil price volatility.

The long run relationship between crude oil price volatility (VOT), the internet (IUS), the exchange rate (EXR) and the number of foreign tourist arrivals (TRA), is specified with multiple linear regression equations in (1)

$$TRA_t = C + \alpha VOT_t + \beta IUS_t + \gamma EXR_t + \varepsilon_t \quad (1)$$

By referring to the specification of the relationship model in equation (1), we assume that the volatility of crude oil prices, the internet, the exchange rate and the number of foreign tourist arrivals are cointegrated. The parameters α, β, and γ are the cointegration parameters or known as the long run coefficients of

crude oil prices volatility, the internet and exchange rates against the number of foreign tourist arrivals, while C is the intercept and ε_t is the error that is normally distributed, independent (unautocorrelated) and homoscedastic.

We employ the autoregressive distributed lag (ARDL) model to test the effect of the crude oil prices volatility, the internet, and the exchange rate on the number of foreign tourist arrivals. The ARDL model formula with the lag length p, q, r and s written as ARDL(p, q, r, s) is as follows (Pesaran and Shin, 1999; Heij et al., 2004)

$$TRA_t = C_0 + \sum_{i=1}^{p}\theta_i TRA_{t-i} + \sum_{j=0}^{q}\alpha_j VOT_{t-j} + \sum_{k=0}^{r}\beta_k IUS_{t-k} + \sum_{l=0}^{s}\gamma_l EXR_{t-l} + \varepsilon_{1t} \quad (2)$$

where C_0, θ_i $(i=1,2,...,p)$, α_j $(j=0,1,\ldots,q)$, β_k $(k=0,1,\ldots,r)$, γ_l $(l=0,1,\ldots,s)$ are the parameters of the regression equation and ε_{1t} is the error or residual that is independent one another and homoscedastic. The ARDL model in equation (2) will produce a long run cointegration equation in equation (1) if each variable of crude oil price volatility, the internet, the exchange rate and the number of foreign tourist arrivals reaches equilibrium in such a way that $C=\frac{C_0}{1-\sum_{i=1}^{p}\theta_i}$, $\alpha=\frac{\sum_{j=0}^{q}\alpha_j}{1-\sum_{i=1}^{p}\theta_i}$, $\beta=\frac{\sum_{k=0}^{r}\beta_k}{1-\sum_{i=1}^{p}\theta_i}$ and $\gamma=\frac{\sum_{l=0}^{s}\gamma_l}{1-\sum_{i=1}^{p}\theta_i}$.

To test the effect of crude oil prices volatility, the internet and the exchange rates on the number of foreign tourist arrivals using equation (2), we follow the following a procedure as follows: (i) testing for stationarity of all variables, (ii) testing for cointegration (if one or all variables are stationary at first difference), and (iii) estimating the model accompanied by testing for error assumption and stability of the regression parameters.

In the first step, we perform a stationarity test of all variables employing the Perron test with break date (Perron, 1989; Brooks, 2014), hereafter expressed as PB. The PB test uses the ADF equation. For example, to test for stationarity of the TRA variable, the ADF equation with break date is as follows:

$$D(TRA_t) = \Psi TRA_{t-1} + \mu + \varnothing_1 D_t + \varnothing_2 (t-T_b)D_t + \lambda t + \sum_{i=1}^{p}\varphi_i D(TRA_{t-i}) + \varepsilon_{2t} \quad (3)$$

Where Ψ, μ,$\varnothing_1$, $\varnothing_2$, λ and φ_i $(i=1,2,\ldots,p)$ in equation (3) are the parameters of the regression equation. Furthermore, ε_{2t} is the error, and t is the trend, T_b is the break date, and D_t is the dummy variable which is defined as

$$D_t = \begin{cases} 0 \ if \ t < T_b \\ 1 \ if \ t \geq T_b \end{cases}, \ t = 1995,1996,\ldots,2018.$$

Variable $D(TRA_t)$ is the first difference form of TRA_t where $D(TRAt) = TRA_t - TRA_{t-1} = TRA - TRA(-1)$. The hypothesis of the stationary test is formulated as H_0: time series is not stationary versus H_1: time series is stationary.

In the second step, we perform a cointegration test between the crude oil price volatility, the internet, the exchange rate, and the number of foreign tourist arrivals. We employ the ARDL bound cointegration test (Pesaran et al., 2001). In the ARDL bound cointegration test, one or all the regressors in the model are assumed to be non-stationary at second difference or not I(2) process, but all the regressors are stationary at level or first difference or compound of both. Meanwhile, Sam et al. (2019) state that the dependent variable could be non-stationary at first difference or not I(1) process. The ARDL bound model formula is

$$D(TRA_t) = C_0 + \sum_{i=1}^{p-1}\theta_i D(TRA_{t-i}) + \sum_{j=0}^{q-1}\alpha_j D(VOT_{t-j}) + \sum_{k=0}^{r-1}\beta_k D(IUS_{t-k}) + \sum_{l=0}^{s-1}\gamma_l D(EXR_{t-l}) + \tau_1 TRA_{t-1} + \tau_2 VOT_{t-1} + \tau_3 IUS_{t-1} + \tau_4 EXR_{t-1} + \varepsilon_{2t} \quad (4)$$

In equation (4), τ_i $(i=1,2,3,4)$ is the parameter of the regression equation. To test for cointegration, the hypothesis formula is $H_0 : \tau_1 \neq \tau_2 \neq \tau_3 \neq \tau_4$ (there is no cointegration between variables) versus H_1: there is $i(i = 1,2,3,4)$ such a way that $\tau_i \neq 0$ (there is cointegration between variables). To test the hypothesis, we employ the F-test with the following criteria: (i) If the F-statistic is greater than the upper bound critical value I(1) then the hypothesis H_0 is rejected (H_1 accepted), or in other words, there is a cointegration between the volaitility of crude oil prices, the internet, the exchange rate and tourist arrival; (ii) If the F-statistic value is smaller than the lower bound critical value I(0) then the hypothesis H_0 is accepted (H_1 is rejected), and; (iii) in other cases, the hypothesis test does not make any conclusion.

In the third step, we estimate the error correction model (ECM-ARDL). The ECM-ARDL(p-1, q-1, r-1, s-1) model formula (Heij; 2004) as follows

$$D(TRA_t) = \alpha_0 D(VOT_t) + \beta_0 D(IUS_t) + \gamma_0 D(EXR_t) + \pi EC_{t-1} + \sum_{i=1}^{p-1}\theta_i^* D(TRA_{t-i}) + \sum_{j=0}^{q-1}\alpha_j^* D(VOT_{t-j}) + \sum_{k=1}^{r-1}\beta_k^* D(IUS_{t-k}) + \sum_{l=1}^{s-1}\gamma_l^* D(EXR_{t-l}) + \varepsilon_{2t} \quad (5)$$

In Pesaran and Shin (1999), equation (5) is the ECM-ARDL model with restricted intercept and no trend (case 2). The coefficient π is the error correction coefficient and the variable EC_t is the error correction variable. The ECM-ARDL model is called the one-way relationship short-run model of the crude oil price volatility, the

internet, and the exchange rate to the number of foreign tourist arrivals.

As the completeness of testing the effect of crude oil prices volatility, the internet and the exchange rate on the number of foreign tourist arrivals, we test the classical assumptions (autocorrelation, homoscedastic, and error normality) and the stability of the ARDL(p, q, r, s) model parameters. For that purpose, we employe the Breusch-Godfrey LM, the Breusch-Pagan-Godfrey, and the Jarque Bera tests to test assumptions autocorrelation, homoscedasticity, and normality respectively. Afterwards, to test the stability of the parameters of the ARDL model, we employ the CUSUM test and the CUSUM Square test (Brown et al., 1975).

4. RESULTS AND DISCUSSION

4.1. Results

The use of the ARDL model to test an effect does not require variable stationarity testing requirements. However, since one of the variables involved in this model should not be stationary at second difference or I(2) process. Therefore, before we proceed, we first need to test for stationarity of all the variables employing the PB test. The purpose is to ensure that not any of the four variables involved in the model is I(2) process. The stationarity test results are summarized in Table 1. We can see that statistical values in Table 2, the crude oil prices volatility variable, and the number of tourist arrival variable are all stationary at first difference. Meanwhile, the internet and exchange rate variables are stationary at level and also at first difference.

Next, we test for cointegrating between the variables: the crude oil price volatility, the internet, the exchange rate, and the number of foreign tourist arrival. As stated in the methodology subsection above, we employ the ARDL bound cointegration test. This test is preceded by the determination of the ARDL model lag length. Based on the Akaike Information Criteria (AIC), we obtain the lag length p = 3, q = 0, r = 2 and s = 3. So, the ARDL bound test is based on the ARDL(3,0,2,3) model. From the calculation results, we obtain an F-statistic value of 4,828. Meanwhile, the upper bound critical value I(1) at the 5% significance level is 4.306. Because the F-statistic value is higher than the upper bound critical value (1), then we conclude that at the 5% significance level, there is cointegration between the volatility of crude oil prices, the internet, the exchange rate, and the number of foreign tourist arrivals. This result also gives a signal that in the long run there is a relationship between crude oil price volatility, the internet, exchange rate, and the number of tourist arrivals. However, this conclusion needs to be based on the significance of the long run parameters in equation (1).

Afterwards, we estimate the long run coefficients of the ARDL(3,0,2,3) model and the short run coefficients of the ECM-ARDL(2,0,1,2) model. The estimation results of all model parameters are presented in Table 2.

In panel A, it appears that the long run coefficient of the internet is 5% so that we conclude that at a significance level of 5%, there is a positive long run influence of the internet on the number of tourist arrivals in Indonesia. Every 1% of the internet rises, the number of foreign tourist arrivals rises by 0.49%.

Furthermore, in Panel B it appears that the coefficients of crude oil prices volatility and exchange rate are significant. In other words, there is a negative short run influence of the volatility of crude oil prices on the number of foreign tourist arrivals. At the same time, there is also a positive short run influence of the exchange rate on the number of foreign tourist arrivals. This conclusion is said to be valid as all model assumptions are satisfied, both classical assumption for residual (autocorrelation, homoscedasticity, and normality) and stability assumption of the ARDL model parameters as shown by Figure 1.

4.2. Discussions

The present study finds that in the long run, the internet has an influence on the number of foreign tourist arrivals. This finding is aligned with the theory stated in the introduction (Meltzer, 2014; World Bank, 2016; Zengin and Arici, 2017). It also agrees with that of Agiomirgianakis et al. (2018). Meanwhile, in the short run, the study finds an influence of crude oil price volatility (despite being negative) on the number of foreign tourist arrivals, bringing this study to confirm the theory put forward by Yang et al. (2002), Rentschler (2013), Rafiq et al. (2009), Trang et al. (2017), Eyden et al. (2019), Bulman and Simon (2003), Dritsakis (2004) and Pangannavar (2014).

Table 1: Unit root test with break date of perron

Variable	Intercept		Intercept and Trend	
	Test Statistic	Break Date	Test Statistic	Break Date
VOT	−3.4448	2005	−3.6431	2015
D(VOT)	−5.7818*	2001	−5.7754*	2001
IUS	−5.1014*	2015	−6.6184*	2011
D(IUS)	−7.0118*	2001	−6.7082	2001
EXR	−21.6340*	2014	−18.3887*	2014
D(EXR)	−7.2166*	2000	−7.0520*	2000
TRA	−0.0287	2010	−2.0476	2002
D(TRA)	−6.3062*	2006	−8.6085*	2003

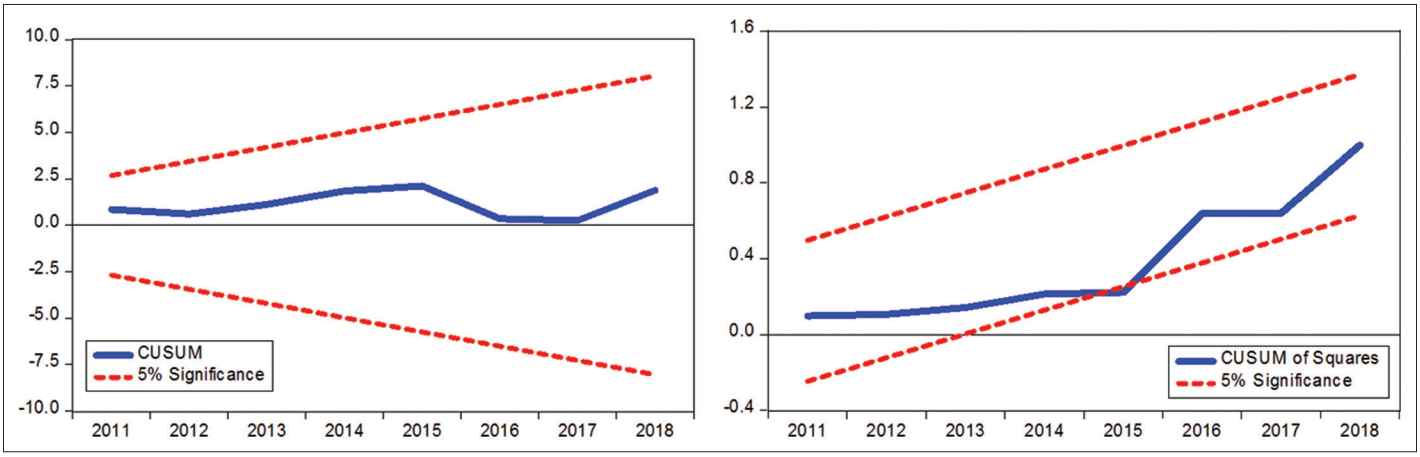
*means significant at 1% significance level

Table 2: Estimation of long run and short run coefficients

Constant and variable independent	Coefficient	t-Statitics	P-value
Panel A : Long run coefficient, Dependent variable: TRA			
C	4.4917	2.1375	0.0650
VOT	−0.4876	−0.3889	0.7075
IUS	0.4085	2.7939	0.0234
EXR	0.4989	0.9277	0.3807
Panel B: Short run coefficient, Dependent variable: D(TRA)			
D(TRA(-1))	−0.4743	−2.6102	0.0311
D(TRA(-2))	−0.3717	−1.9598	0.0857
D(VOT)	−0.2807	−1.0641	0.3183
D(VOT(-1))	−0.7032	−4.5858	0.0018
D(VOT(-2))	−0.3874	−2.4850	0.0378
D(EXR)	0.4859	2.2628	0.0535
D(EXR(-1))	0.2293	3.1247	0.0141
EC(-1)	−0.4231	−6.0172	0.0003

In sequence, p-value for the Breusch-Godfrey Serial Correlation LM test, the Breusch-Pagan-Godfrey test, and the Jarque Berra test are 0.191, 0.117, and 0.959

Figure 1: Stability test results of ARDL(3,0,2,3) model parameters



Similarly, in the short run, the exchange rate is found to positively affect the number of foreign tourist arrivals. This finding is particularly supported by the theories expressed by Pilbeam (2006) and Al-Mulali et al. (2019). It is also in line with that of Vita (2014), Tavares and Leitao (2016), Gibtiah et al. (2018), and Wamboye et al. (2020). However, it contradicts that of Kosnan et al. (2012), Faidzin and Cahyono (2017), Nugroho et al. (2017). These studies did not report the existence of influence from exchange rate to the number of foreign tourist arrivals. This discrepancy could be caused by variation in data period used (Adam et al., 2015) especially for the same research location and also by variation in socio-cultural and economic conditions of a country where research is conducted (Ozturk, 2010).

Furthermore, the present study reveals the positive influence of the internet on the number of foreign tourist arrivals. It, therefore, is consistent with Ramos and Rodrigues (2013) and Sun et al. (2019) who also reported in their studies the influence of the internet on the number of foreign tourist arrivals.

With these findings, the Indonesian government in particular needs to take policy with regard to crude oil energy industry, domestic currency exchange stability, and development of internet technology. In the energy field, the government should continue to subsidize households to stabilize crude oil prices so that crude oil prices can be depressed and do not cause inflation.

5. CONCLUSIONS

Crude oil is a mineral resource that is needed by all countries in the world. It is used to run production machinery, transportation tools, and electricity-generating machinery. Meanwhile, the internet and exchange rate are also important assets in the economy. The internet is a technology used to send and receive information in economic activities, while exchange rate is a unit price of transactions in international trade. On the other hand, tourism industry has become very strategic to support a country's economy. Therefore, factors that influence the private sector including crude oil prices volatility, the internet, and exchange rate are important to know.

The objective of the present study is to examine the effect of crude oil prices volatility, the internet, and exchange rate on the number of foreign tourist arrivals in Indonesia. To test this influence, we use the annual time series data on crude oil prices, the internet, exchange rate, and the number of foreign visitor arrival covering the period from 1995 to 2018. To analyze the data, we employ the ARDL model and the ECM-ARDL model.

The cointegration test result shows that there is a cointegration between the price of crude oil prices volatility, the internet, the exchange rate, and the number of foreign tourist arrival. Meanwhile, the result of the ARDL model estimation indicated a positive long run effect of the internet on the number of foreign tourist arrivals in which every 1% rise in the internet led to an increase of 0.49% in the number of foreign tourist arrivals. Furthermore, based on the estimation results of the ECM-ARDL model, we conclude that in the short run, the prices of crude oil volatility negatively impact the number of tourist arrivals. As for the exchange rate, it is found to positively affect the arrivals of foreign tourists, meaning that if the exchange rate of the IDR appreciates (depreciates) against the USD, the number of foreign tourist arrivals declines (increases).

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