Do Oil Price Volatility and Exchange Rates Affect International Tourist Arrivals Asymmetrically? A Case Study of Sabah

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ABSTRACT

This study examines the asymmetric effect of exchange rates and oil price volatility on international tourist arrivals in Sabah, Malaysia, using a nonlinear Autoregressive Distributed Lag (NARDL) model. The study findings showed there is long-run cointegration amongst the studied variables. In addition, the results also showed a significant and inverse long-run relationship between exchange rates, oil price volatility, and international tourist arrivals for both positive and negative series of exchange rates and oil price volatility. However, only the volatility of oil prices has an asymmetric influence on international tourist arrivals, where a decrease in oil price volatility has a more significant effect than an increase, indicating that positive information, such as a decline in oil price volatility, has a greater influence on tourist arrivals in Sabah. Thus, these findings highlight the importance of incorporating economic considerations with asymmetric effects into models of tourist arrivals. Practically, the findings provide significant insights for tourism stakeholders, allowing for more informed decision-making and strategic planning. Acknowledging potential limitations, such as the study's narrow focus on Sabah and excluding other potential factors is essential. Future research can expand the analysis to include additional variables and investigate additional destinations to provide a complete understanding.

Keywords: *Oil Price Volatility, Exchange Rates, Tourist Arrivals, Asymmetric, NARDL*

INTRODUCTION

Tourism, including Malaysia, promotes global economic growth and development (Karimi, 2018). Malaysia attracts millions of international tourists annually due to its diverse attractions, which include lively cities, beautiful islands, and verdant forests. These tourists contribute to the economy through expenditures on lodging, transportation, food, shopping, and other tourism-related activities (Khan et al., 2022; Kozhokulov et al., 2019). Thus, tourism has become an important sector that contributes to Malaysia's overall economic growth. Sabah, located on the island of Borneo in East Malaysia, is home to numerous natural marvels, including the majestic Mount Kinabalu, pristine coral reefs, and various plant and animal species in its rainforests. Tourism is essential to the economic growth of Sabah, a prominent domestic and international tourist destination (Chan et al., 2022).

The push and pull framework is a theoretical concept used in tourism studies to explain the motivations that drive travellers to visit specific destinations (Cengizci et al., 2020; Dean & Suhartanto, 2019). Emerging from Dann's 1977 work, the push-and-pull system provides a comprehensive perspective for understanding the factors influencing travel motivation (Dann, 1977). This theoretical framework describes two broad categories of factors influencing travel decisions: push and pull factors (Bayih & Singh, 2020). Push factors originate from the traveller's background and include internal forces such as economic conditions, political instability or personal biases that lead individuals to seek alternative travel destinations. On the other hand, pull factors are external to the traveller and represent the attractiveness of destination areas, including natural beauty, cultural richness, recreational opportunities, and infrastructure. In this context, oil price volatility is particularly important as it represents a risk associated with travel decisions. Fluctuations in oil prices can impact push factors by affecting travellers' financial situation and disposable income. High oil prices could deter individuals from travelling due to increased transportation costs, which are seen as a risk to their budgets. Conversely, favourable exchange rates and lower transportation costs due to reduced oil prices can strengthen pull factors by making destinations more attractive and affordable for tourists, thereby reducing the perceived risks associated with travel spending.

In other words, it is a theoretical framework that explains the attractiveness of tourist destinations. Various factors, including exchange rate fluctuations and oil price volatility, influence the attractiveness of tourist destinations (Millia et al., 2020). Both variables have an inflationary effect on goods and services, including tourism-related activities (Meo et al., 2018), affecting the competitiveness and attractiveness of destinations for international tourists. For instance, changes in currency exchange rates can impact travellers' buying capacity and subsequently shape their choice of travel destination (Ding & Timmer, 2023). An appreciating domestic currency can

potentially increase the cost of tourism offerings for foreign visitors, which may reduce the number of international tourist arrivals. In instances where the exchange rate is unfavourable, the expenses incurred by tourists during currency conversion into the destination currency tend to rise, increasing transaction costs. This phenomenon can potentially dissuade prospective tourists from selecting a specific location. On the other hand, a devalued domestic currency may increase the affordability and attractiveness of a particular destination, thereby resulting in a higher influx of tourists. The devaluation of currency incentivises the demand for tourism, as tourists perceive it as a financially advantageous opportunity to discover affordable destinations and participate in tourism-related activities.

Meanwhile, oil price risk is the possibility that oil prices will fluctuate significantly and unpredictably over time. These oil price fluctuations introduce uncertainties for the tourism industry, especially regarding transportation costs, hotels, and other tourism-related activities (Al-Mulali et al., 2020). For instance, when oil prices are volatile, it is difficult for airlines and other transportation providers to manage their costs. Variations in oil prices can result in fuel costs that are uncertain and unpredictable. Consequently, transport providers may adopt strategies such as adjusting ticket prices based on fuel costs to mitigate these risks. These strategies may incur transaction costs, ultimately passed to visitors. These higher costs reduce the disposable income available to individuals for spending on tourism activities (Xie & Tveterås, 2020). As a result, potential tourists may have less money to allocate towards travel, impacting tourist demand. The increased transaction cost may dissuade potential visitors from selecting a particular destination or restrict their spending capacity. In contrast, decreased oil price volatility can reduce the transaction costs associated with transportation expenses. Airlines and transportation companies can more effectively plan and manage costs when oil prices are relatively stable. This stability can lead to more predictable ticket prices and visitor transportation costs, making travel more affordable and alluring.

Understanding the relationship between these variables and international tourist arrivals is crucial for policymakers and stakeholders to develop effective strategies for promoting sustainable tourism development. The existing literature provides mixed findings on the relationship between exchange rates, oil prices, and tourism arrival (Meo et al., 2018; Millia et al., 2020). Some studies suggest that these factors significantly impact tourism arrivals, while others find no significant effect (Millia et al., 2020). Additionally, the literature has primarily focused on linear relationships (Ali et al., 2018; Millia et al., 2020; Puah et al., 2018), neglecting these variables' potential nonlinear and asymmetric effects, particularly in the case of Sabah. The term asymmetric effect refers to the disparate or varying influence of changes in oil price volatility and exchange rates (Meo et al., 2018). As in the tourism industry, an increase or decrease in the volatility of oil prices or exchange rates does not have an equal or symmetrical impact on the number of visitors visiting a destination. For instance, an increase in oil price volatility or exchange rates may have a greater negative effect on tourism arrivals than a decrease in oil price volatility or exchange rates.

The asymmetric effect of these variables can be attributed to a few factors, such as price sensitivity (Divisekera, 2010; Kusni et al., 2013; Salman et al., 2010). Tourists frequently exhibit sensitivity towards price fluctuations, encompassing expenses associated with transportation and the chosen destination. When there is a surge in oil price volatility or fluctuations in exchange rates, leading to escalated costs, tourists may exhibit a more pronounced response by curtailing their travel or opting for alternative destinations that provide superior value. Conversely, when there is a reduction in the volatility of oil prices or exchange rates, it may signal a more stable and predictable market environment, alleviating concerns and having a less pronounced impact on tourist arrivals. For instance, a Study by Meo et al. (2018) suggested asymmetric long-run effects of exchange rate and oil prices on tourism demand in Pakistan.

This study seeks to contribute to the existing literature by offering empirical evidence on the asymmetric effects of exchange rate fluctuations and oil price volatility on tourism demand by analysing data on international tourism arrivals, exchange rates, and oil price volatility in Sabah. The findings of this study will have practical implications for policymakers, industry professionals, and Sabah tourism stakeholders. In addition, the study's findings can help identify opportunities for capitalising on auspicious conditions to increase tourism arrivals. Therefore, this study employs the nonlinear autoregressive distributed lag (NARDL) estimation method (Shin et al., 2014) to examine the asymmetric effect of oil price volatility and exchange rates on international tourist arrival in Sabah. This NARDL technique has numerous significant benefits. This technique is applicable regardless of whether the variables are stationary, integrated, or cointegrated. Second, its statistical properties in tiny samples are superior. Thirdly, it permits testing to determine whether an asymmetry exists in the long run, short run, or both.

RESEARCH METHODOLOGY

Data

Monthly data (end of period) from January 2000 until December 2019 were used for empirical analysis, including international tourist arrival to Sabah, Brent crude oil prices, and the trade-weighted index (TWI). Excluding data from the pandemic period from the study, which utilised monthly data from January 2000 to December 2019, is justified for a few reasons. First, including the pandemic period would introduce distortions and make it difficult to compare findings with trends before the pandemic because of the unprecedented disruptions and changes in travel patterns. Second, the unique circumstances during the pandemic, such as travel restrictions and changes in consumer behaviour, make it difficult to isolate the effects of oil price volatility and exchange rates on tourist arrival. Thirdly, focusing on pre-pandemic data is consistent with the research's scope and objectives, allowing for a targeted investigation of the factors influencing tourist arrival under normal conditions. The data are obtained from multiple sources such as Sabah

Tourism Board (tourist arrival), International Monetary Fund (IMF) (exchange rate), and World Bank databases (oil prices).

The choice of oil price volatility and exchange rates as key macroeconomic variables in our study is closely linked to their influence on the push and pull factors affecting international tourist arrivals in Sabah, Malaysia. In the push-and-pull system, oil price volatility and exchange rates are key determinants of tourists' decision-making processes. First, oil price volatility, which refers to the risk associated with the unpredictability of transportation costs due to fluctuations in oil prices, tends to result in higher transportation costs. This unpredictability directly impacts transportation costs, an important push factor influencing tourists' perceptions of affordability and accessibility (Maitra et al., 2021). Fluctuations in oil prices can significantly alter travel costs, affecting tourists' willingness to visit Sabah. Second, exchange rates represent a fundamental pull factor that influences the attractiveness and affordability of travel destinations (Meo et al., 2018). Favourable exchange rates increase the purchasing power of international tourists and make Sabah more attractive as a travel destination. Conversely, unfavourable exchange rates can deter tourists due to increased costs.

This study used trade-weighted index (TWI) and oil price volatility as a proxy for exchange rate and oil price measurements, respectively. Using a TWI as an exchange rate proxy has advantages over bilateral exchange rates (Lily et al., 2018). A TWI provides a more comprehensive representation of a country's trade competitiveness by accounting for changes in exchange rates against a basket of currencies that represents each currency's importance in the country's overall trade. It records trade relationships with multiple partners and thus enables a balanced and representative assessment. An increase (decrease) in TWI indicates an appreciation (depreciation) of the local currency against several foreign currencies. As for the tourism industry, Sabah has received visitors from several countries, such as China, Japan, South Korea, and others. Therefore, using a bilateral exchange rate could be less representative of multiple countries. For example, Al-Mulali et al. (2020) showed that the exchange rate (a bilateral exchange rate) has no significant effect on tourist arrivals, implying an appropriate measure of exchange rate movement in tourism-related studies.

For some reasons, oil price volatility is used as a proxy for the oil price, as opposed to the oil price value itself. The volatility of oil prices captures the dynamic character of oil markets, reflecting the fluctuations and uncertainty that influence economic outcomes (Millia et al., 2020). It enables a more accurate evaluation of the potential economic disruptions caused by abrupt and significant changes in oil prices. Moreover, oil price volatility influences market participants' behaviour and decision-making and prompts policymakers to consider the risks and vulnerabilities associated with oil price disruptions.

Measuring Volatility

This study applied the conditional variance (h_t) of the monthly oil prices derived from a GARCH model (Bollerslev, 1986) to measure oil price volatility. The GARCH model's expected volatility in a series depends on past behaviour and is a more accurate approximation of oil price volatility than the standard deviation. We specify a GARCH (1,1) model as follows:

$$\begin{aligned} oilp_t &= oilp_{t-1} + e_t \\ h_t &= a_o + a_1 e_{t-1}^2 + \beta_1 h_{t-1t}^2 \end{aligned} \tag{1}$$

where $oilp_t$ is the oil prices and ε_t is the stochastic term. The variance equation indicates that variance depends on both past shock values (lagged square residual terms) and past variance values. (Bollerslev, 1986). The higher value (h_t) relates to higher oil price volatility.

NARDL Model

This study applied the NARDL approach by Shin et al. (2014) as the following:

$$\Delta y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 x_{t-1}^{+} + \beta_3 x_{t-1}^{-} + \sum_{i=1}^{p} \varphi_i \Delta y_{t-i} + \sum_{i=0}^{q} \left(\theta_i^{+} \Delta x_{t-i}^{+} + \theta_i^{-} \Delta x_{t-i}^{-} \right) + e_t \tag{2}$$

Equation (3) specified to illustrate the asymmetric long-run effect of oil price volatility and real exchange rates on international visitor arrivals (Ibrahim, 2015; Shin et al., 2014):

$$ita_t = \alpha_0 + \alpha_1 voilp_t^{+} + \alpha_2 voilp_t^{-} + \alpha_3 reer_t^{+} + \alpha_4 reer_t^{-} + e_t \tag{3}$$

Where ita_t is the international tourist arrival, *voilp* and *reer* are the oil price volatility and exchange rates (TWI), respectively, where $\alpha = (\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4)$ is a vector of unknown long-run parameters to be estimated. Meanwhile, the $voilp_t^{+}$ and $voilp_t^{-}$ represents the partial sums of positive and negative changes in *voilp*, while $reer_t^{+}$ and $reer_t^{-}$ represents the partial sums of positive and negative changes in *reer*:

$$voilp_t^{+} = \sum_{i=1}^{t} \Delta voilp_i^{+} = \sum_{i=1}^{t} \max\left(\Delta voilp_i, 0\right) \; ; \; reer_t^{+} = \sum_{i=1}^{t} \Delta reer_i^{+} = \sum_{i=1}^{t} \max\left(\Delta reer_i, 0\right) \tag{4}$$

and

$$voilp_t^{-} = \sum_{i=1}^{t} \Delta voilp_i^{-} = \sum_{i=1}^{t} \min\left(\Delta voilp_i, 0\right); \; reer_t^{-} = \sum_{i=1}^{t} \Delta reer_i^{-} = \sum_{i=1}^{t} \min\left(\Delta reer_i, 0\right) \tag{5}$$

Equation (2) is reformulated into an ARDL model (Ibrahim, 2015; Pesaran et al., 2001; Shin et al., 2014) as follows:

$$\begin{aligned}\Delta ita_t = {} & \beta_0 + \beta_1 ita_{t-1} + \beta_2 voilp^{+}_{t-1} + \beta_3 voilp^{-}_{t-1} + \beta_4 reer^{+}_{t-1} + \beta_5 reer^{-}_{t-1} + \sum_{i=1}^{p} \varphi_i \Delta ita_{t-i} \\ & + \sum_{i=0}^{q} \left(\theta_i^{+} \Delta voilp^{+}_{t-i} + \theta_i^{-} \Delta voilp^{-}_{t-i} + \gamma_i^{+} \Delta reer^{+}_{t-i} + \gamma_i^{-} \Delta reer^{-}_{t-i} \right) + e_t \end{aligned} \tag{6}$$

where all variables are previously defined, and *p* and *q* are lag orders. The term $\sum_{i=0}^{q} \theta_i^{+}$ and $\sum_{i=0}^{q} \gamma_i^{+}$ indicate the short-run effects of positive changes in the oil price volatility and exchange rates (appreciation in MYR) while $\sum_{i=0}^{q} \theta_i^{-}$ and $\sum_{i=0}^{q} \theta_i^{-}$ measure the short-run effects of negative changes in the oil price volatility and exchange rates (depreciation in MYR). Equations (3) and (6) $\alpha_2 = -\beta_3 / \beta_1$ represent the long-run impacts of an increase and decrease in oil price volatility on international tourist arrival. Meanwhile, both $\alpha_3 = -\beta_4 / \beta_1$ and $\alpha_4 = -\beta_5 / \beta_1$ represent the long-run effects of an increase and decrease in exchange rates on international tourist arrival.

A Wald *F* test was applied to test cointegration among the variables of the null hypothesis of $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (Pesaran et al., 2001). If cointegration exists (the computed *F*-statistic exceeds the upper bound critical value), thus, using the Wald test in Equation (6), the long-run asymmetry test can be done on the null hypotheses of $H_0 : -\beta_2 / \beta_1 = -\beta_3 / \beta_1$ (oil price volatility) and $H_0 : -\beta_4 / \beta_1 = -\beta_5 / \beta_1$ (exchange rate movement). In the meantime, the null hypotheses of the short-run asymmetry tests can be examined using the short-run asymmetry tests as $H_0 = \sum_{i=0}^{q} \theta_i^{+} = \sum_{i=0}^{q} \theta_i^{-}$ (oil prices) and $H_0 = \sum_{i=0}^{q} \gamma_i^{+} = \sum_{i=0}^{q} \lambda_i^{-}$ (e.g., Delatte & López-Villavicencio, 2012; Fousekis et al., 2016).

Unit Root Tests

This study applied a series of unit root tests to determine the studied variables' stationarity. The Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) (Dickey & Fuller, 1979), and Phillips-Perron (PP) (Phillips & Perron, 1988) unit root tests was adapted in this study. Schwarz information criterion was applied to select the lag length for the ADF.

FINDINGS

Descriptive Analysis

Figure 1 shows the international tourist arrivals (logintarrival), exchange rates (logreer), and oil price volatility (opvolatility). Sabah's international tourist arrival shows an upward trend, although there was a drop after the Asian and Global Financial crises (2008). In contrast, there was a downward trend (depreciation) for the exchange rates. Meanwhile, the volatility of oil prices showed fluctuations over the sample period. A sudden volatility change occurred during the global economic crisis and in 2015.

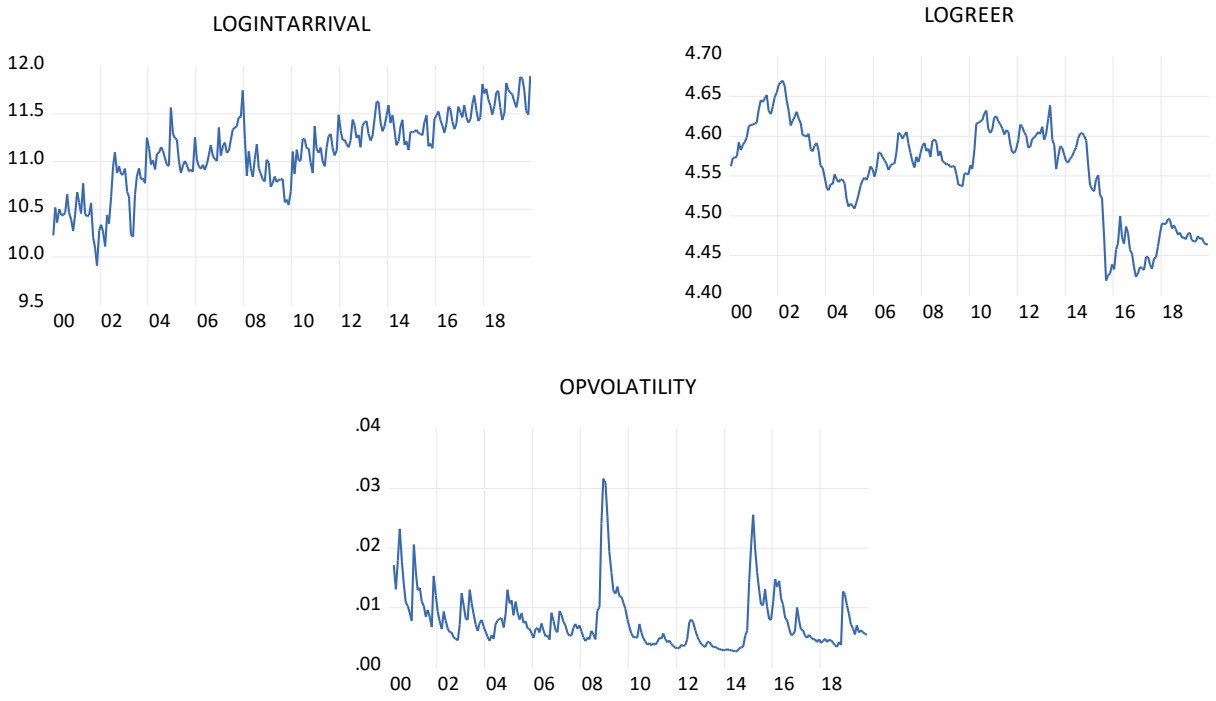

Fig 1 International tourism arrivals, exchange rates and oil price volatility

Unit Root Tests

At the 1% significance level, both unit root tests (ADF and PP) indicated that all variables were integrated less than *I*(2) (see Table 1). Consequently, the NARDL model is suitable for analysing the cointegration among variables (Meo et al., 2018).

Table 1 Stationarity tests

Variable	Level		First Difference	
	ADF	**PP**	**ADF**	**PP**
ITA	-2.7152	-6.0818**	-5.5917***	-49.3927***
OILP	-4.1422	-2.1481	-14.90597***	-15.30489***
REER	-2.6411	-2.2361	-15.3541***	-12.2191***

Notes: ***, ** and * denote significance at 1%, 5% and 10%, respectively. ITA refers to International Tourist Arrivals, REER refers to the real exchange rate (TWI), and OP refers to oil price volatility. The constant and trend terms are included in the test equations, and the optimal lag order for the ADF test is selected using SIC. All variables are in logarithm form.

Effects of Oil Price Volatility and Exchange Rates

The estimation results are shown in Table 2. Following the bounds tests (optimal lag 4), evidence of cointegration between international tourism arrival, exchange rates and oil price volatility was significant at 1 percent, suggesting that both oil price volatility and exchange rates co-move with international tourist arrival over the long run. In addition, the findings revealed that both the negative and positive series of the exchange rates and oil price volatility have a negative relationship with Sabah's international tourism arrivals. The results implied that an increase (decrease) in the exchange rate and oil price volatility would reduce (increase) the number of international tourists arriving in Sabah. In brief, both factors are important in attracting international tourists to Sabah. These findings are consistent with previous studies examining the relationship between these variables (Brahim, 2022; Meo et al., 2018; Puah et al., 2018; Xie & Tveterås, 2020).

However, the asymmetric test indicates that only oil price volatility has an asymmetric effect on international tourist arrivals. Interestingly, a decrease in oil price volatility has a larger impact than an increase in oil price volatility. The results show that a 1% increase in the positive oil price volatility series will decrease tourist arrival by 0.23 %, while a 1% decrease in the negative series will increase tourist arrival by 0.3%. It implied that the positive information (a decrease in oil price volatility) has a higher effect on international tourist arrival in Sabah, which is consistent with the price sensitivity argument. This finding suggests that tourist arrival is affected differently by positive and negative series of oil price volatility. The finding aligns with Meo et al.'s (2018) study, where a decrease in oil prices has a more significant impact than an increase in oil prices in Pakistan. The symmetric test also revealed short-run asymmetry for oil price volatility. The finding suggests that immediate changes in oil price volatility may also directly impact tourist arrivals. Such an observation could stem from tourists' heightened sensitivity to economic uncertainties, perceiving rising volatility as indicative of instability.

The asymmetric effect of oil price volatility on tourist arrivals can be attributed to a combination of factors, including tourists' varying price sensitivity and the inertia of travel plans. Price sensitivity plays a central role in tourists' travel spending decisions. When oil prices fall, resulting in lower transportation costs, tourists show increased price sensitivity and are more likely to respond positively due to increased affordability. This sensitivity to cost savings leads to a greater increase in tourist arrivals during periods of decreasing oil price volatility. Conversely, if volatility in oil prices or exchange rates decreases, this may signify a more stable and predictable market environment, easing concerns and making the impact on tourist arrivals less pronounced. The

finding is consistent with previous studies (Divisekera, 2010; Kusni et al., 2013; Salman et al., 2010).

Moreover, the inertia of travel plans, where tourists have already booked their trips in advance, further mitigates the immediate impact of cost increases on tourist arrivals. The concept of travel plan inertia refers to the tendency of tourists to stick with their pre-booked travel plans even when cost increases or better options become available (Chorus, 2014). Despite higher transportation costs, tourists may be less inclined to cancel their reservations, resulting in a smaller decline in arrivals compared to the response to cost savings. Thus, while price sensitivity triggers a stronger response to falling transportation costs, inertia in travel plans dampens the immediate response to cost increases, leading to an asymmetric effect of oil price volatility on tourist arrivals. Conversely, if oil prices and transportation costs increase, tourists may show less price sensitivity to cost increases. This understanding highlights the importance of considering both price sensitivity and the timing of travel bookings when analysing the impact of oil price volatility on tourist behaviour and destination selection.

Table 2 Asymmetric estimation results

Cointegration Test [1,2,0,0,0]	
F_{PSS}	8.55***
Long Run Coefficients	
OILP-	-0.30**
OILP+	-0.23**
REER-	-2.12**
REER+	-2.83**
Symmetric Test	
OILP: $Wald_{LR}$	2.1356**
OILP: $Wald_{SR}$	2.1838**
REER: $Wald_{LR}$	-1.0748
REER: $Wald_{SR}$	-
Diagnostic Tests	
Serial correlation: LM(4)	5.91
Heteroskedasticity: ARCH(4)	4.11
CUSUM	S

Notes: (1) ***, **and * denote significance at 1%, 5% and 10% respectively; (2) The lag order denotes as (); (3) W_{LR} and W_{SR} refer to the Wald test for the long run and short run symmetry respectively. and (4) F_{PSS} indicates the Paseran-Shin-Smith (2001) F test statistic. Following Shin et al.(2014), the conservative of critical values is applied, k = 2. The Upper bound critical values (Table C1(ii)) are 4.46, 5.16 and 6.67 at 10 percent, 5 percent and 1 percent respectively. All variables are in logarithm form.

CONCLUSION

This study investigates the asymmetric effects of oil price volatility and exchange rates on foreign tourist arrivals in Sabah, Malaysia. The study's findings indicated that oil price volatility and exchange rate movement significantly inverse international tourist arrival into Sabah. It implied that exchange rate movement and oil price volatility are essential factors determining Sabah international tourist arrivals. In addition, the results indicate that international tourist

arrivals in Sabah are sensitive to the volatility of oil prices. Moreover, the finding also found an asymmetric long-term effect of oil price volatility on international visitor arrival in Sabah. Specifically, the study found that a decrease in oil price volatility has a greater effect on tourist arrivals than an increase in oil price volatility.

The findings provide insights into theoretical and practical implications. The study suggests that tourists are sensitive to economic factors such as oil price volatility and exchange rate movements when making travel decisions. Identifying an asymmetric long-term effect of oil price volatility on tourist arrivals indicates that tourists may react differently to increases and decreases in oil price volatility. Thus, these findings highlight the importance of incorporating economic considerations with asymmetric effects into models of tourist behaviour, such as the push-pull theory.

Additionally, the push and pull framework is a practical tool for destination marketing and management. Tourism managers can use their understanding of push and pull factors to develop targeted marketing strategies, increase the attractiveness of destinations, and effectively respond to tourists' needs and wants. By aligning advertising efforts with the motivations and preferences of target markets, destinations can attract more visitors and sustainably grow their tourism industry.

In addition, these findings have significant implications for tourism industry policymakers and stakeholders. First, by recognising the asymmetric effects of oil price volatility and exchange rates, policymakers can devise targeted strategies to mitigate the adverse effects of increased volatility while capitalising on the beneficial effects of exchange rate fluctuations. Monitoring and managing oil price fluctuations and implementing policies to guarantee a competitive exchange rate can contribute to the stability and growth of Sabah's tourism industry.

The finding that a decrease in oil price volatility has a greater impact than an increase implies that positive news about oil price stability or a decrease can generate greater interest and confidence among potential tourists. The asymmetric effect of oil price volatility suggests that tourism stakeholders should monitor oil price volatility trends and take advantage of positive developments to attract more visitors to Sabah, especially in favourable market conditions.

Moreover, the results highlight the need for careful market perception management, as changes in the volatility of oil prices and exchange rates can affect tourists' perceptions of destination costs and stability. Policymakers should endeavour to improve the destination's perceived value and stability, particularly during periods of increased volatility.

Secondly, diversifying Sabah's tourism offers the opportunity to attract tourists from various countries. This diversification could reduce the impact of exchange rate and oil price volatility on tourism arrivals by reducing Sabah's dependence on a few key markets.

Thirdly, investing in infrastructure and marketing can increase Sabah's competitiveness in tourism. The strategy may aid in luring more tourists to Sabah and strengthening the tourism sector's resistance to external shocks like exchange rates and oil price volatility.

Fourthly, tourism authorities in Sabah can tailor their marketing and promotional efforts to target markets that are less sensitive to oil price volatility. They can also emphasise the destination's value proposition beyond economic considerations to attract tourists despite fluctuations in oil prices and exchange rates. Furthermore, in response to the asymmetric effect observed in the study, the tourism industry in Sabah can benefit from periods of lower volatility by implementing targeted marketing and advertising campaigns to highlight the destination's affordability and attractiveness to potential tourists. Conversely, during increased volatility, tourism stakeholders may need to adapt their strategies to address concerns about travel costs and economic stability, potentially mitigating the negative impact on tourist arrivals.

While this study provides valuable insights into the relationship between oil price volatility, exchange rates, and tourist arrivals, there are potential avenues for further research. Future studies could explore additional factors contributing to the observed asymmetric effects and investigate the impact of other economic variables on tourist behaviour in Sabah. Including more factors could help to provide a more comprehensive understanding of the factors affecting Sabah's tourism industry and inform policy decisions to support its growth and development.

The study exploring the asymmetric effects of oil price volatility and exchange rates on tourist arrivals in Sabah, Malaysia, presents valuable insights but also faces potential limitations that could guide future research endeavours. A key limitation lies in the complexity of tourism dynamics, which can include numerous interacting factors beyond economic variables. Future research could delve deeper into this complexity by incorporating political stability, natural disasters, destination marketing efforts, and sociocultural influences to provide a more nuanced understanding of tourist behaviour.

Furthermore, while Sabah offers valuable insights into tourism dynamics, the generalization of the results to other Malaysian states is limited by relying solely on its data. Such limitations hinder a comprehensive understanding of the Malaysian tourism sector as experiences, challenges and development trajectories can vary significantly between states. Future research could broaden the scope by conducting comparative analysis across different destinations or states in Malaysia to understand the differences in the state's tourism dynamics and the country's tourism industry.

ETHICS STATEMENTS

Not available.

AUTHOR STATEMENTS

Jaratin Lily organised the study, overseeing its progression from conceptualisation through data analysis and manuscript drafting. Mori Kogid's contributions were instrumental in shaping the literature review, aiding in data interpretation, and refining the manuscript. Debbra Toria Nipo was responsible for data collection and analysis. Izaan Azyan Abdul Jamil's statistical expertise greatly enhanced the methodology section, ensuring the robustness of the research design. Meanwhile, Mohd. Rahimie Abd. Karim enriched the discussion section with practical insights from real-world implications.

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DECLARATION OF INTERESTS

The authors declare no conflict of interest.

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