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The Asymmetric Impacts of Crude Oil Prices, Inflation, the Exchange Rate, Institutional Quality, and Trade Balance on Tourist Arrivals in Bangladesh: A Nonlinear ARDL Model Approach

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ABSTRACT

The nonlinear interaction of oil prices, inflation, the exchange rate, institutional quality, and trade balance on tourist arrivals in Bangladesh is scrutinized in this study. The technique utilized in this study, Nonlinear Autoregressive Distributed Lag (NARDL), is a novel co-integrating strategy. The yearly time series data used in this study spanned 1995 to 2019. The NARDL bound test is performed to assess if variables like oil prices, inflation, the exchange rate, institutional quality, and trade balance on tourist arrivals are co-integrated. Oil prices and exchange rates, according to the findings, have a long-run negative and significant impact on tourism demand, whereas improvements in institutional quality are positively associated with tourist arrivals. Moreover, the study's findings revealed a nonlinear kinship between the trade balance, inflation, and tourism demand across time. The asymmetric results obtained could enable Bangladeshi policymakers to make more precise decisions.

Keywords: Asymmetric, exchange rate, inflation, institutional quality, NARDL, trade balance

INTRODUCTION

Tourism is a significant growth driver in the world economy. In recent years, tourism has become increasingly essential to the global economy. The number of tourists has increased year over year in recent years because of globalization, preventing a significant expansion in both the sector and service quality. It has become one of the economy's most important

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foundations, thanks to population migration, as well as the enormous tourism options and professionalization of the industry. Tourism is one of the world's most significant economic sectors. It is the third-largest export category, trailing behind fuels and chemicals, contributing to 7% of global trade in 2019. According to the World Economy Forum (WEF), it can account for more than 20% of a country's Gross Domestic Product **(**GDP) in some cases, and it is the world economy's third-largest export sector.

Over the last five decades, the tourism industry has seen explosive growth worldwide. Due to its contributions to global GDP, job creation, poverty alleviation, and inflation reduction, it continues to appear to be a dominant economic engine. Despite hovering in the shadow of terrorism for the past few decades, global tourism has risen to prominence as a fast-growing sector, promoting the development of tourism infrastructure in developing nations in response to local demand. A country with a lower unemployment rate invests in infrastructure and raises per capita income, increasing tax revenue. It increases the country's foreign reserves, boosts economic growth, and attracts international investment, all of which raise living standards (Balcilar et al., 2014; Tang & Abosedra, 2014; Habibi, 2017). Thus, it is vital to understand which microeconomic variables impact the tourism sector to enrich the economy and save the sector. Some worldwide studies look at how the exchange rate, oil prices, and inflation affect tourism demand. Linear trend analysis has been employed in most investigations. However, this research uncovered a non-linear pattern among the research variables by integrating two more crucial components: institutional quality and trade balance.

Exchange rates have been explored repeatedly in the literature as a crucial factor in determining tourism demand. Furthermore, recent research has recommended including the exchange rate in the tourism demand equation to avoid the possibility of a missing component, the exchange rate. Foreigner tourists with strong currencies benefited from the local currency depreciation since their overall tourism expenses were reduced. Due to this, the number of tourists visiting the country is constantly increasing (Vita & Kyaw, 2013). However, when it comes to the exchange rate, there are two schools of thought: some experts argue for appreciation to enhance tourism, while others push for depreciation. Tourism demand is positively influenced by exchange rate appreciation (Toh et al., 2006; Görmüş & Göçer, 2010). On the other hand, exchange rate depreciation is positively correlated with tourism demand, according to Meo et al. (2018), because traveling to a country whose currency has depreciated becomes less expensive.

According to Becken (2008), transportation is crucial to growing tourism, which is strongly reliant on energy sources, such as oil. Inflationary pressures result from higher oil prices, which lower consumer income (Kisswani et al., 2020). Furthermore, as oil prices rise, the cost of production rises in numerous areas, thereby lowering output and increasing unemployment, as well as causing inflation. An increase in oil prices, according to Anoruo

and Elike (2009), has a detrimental impact on economic growth due to demand and supply. Supply-side effects developed because of the huge increase in oil prices, and as a result, the cost of production increased, lowering the supply of items that require a large amount of oil, according to the authors. On the other hand, high oil prices have cut domestic consumption and investment, as well as the purchasing power of the local currency and customers' capacity to purchase products and services. Nigeria's economy, according to Gokmenoglu et al. (2016), is driven by oil. Because tourism is regarded as a luxury item, the trend mentioned above has a significant and unfavorable effect on demand.

Poor institutional quality, among other things, is one of Bangladesh's major impediments. These things are "essential," including legality, ownership rights, anti-exploitation, liability, and government excellence. When it comes to ensuring the success of the tourism industry, organizing activities is critical.

In addition, the tourism industry adds to the economy's growth. Therefore, it is critical to think about how microeconomic variables affect this industry. To this point, most academics have studied the nexus of tourism demand and its drivers in a linear framework. However, in order to investigate structural changes or short-term volatility, linear models cannot be employed. Most studies have looked at the relationship between microeconomic factors (such as oil prices, inflation, and the currency rate) and economic development in a linear context, as previously mentioned. In practice, however, these variables are subject to frequent oscillations and exhibit nonlinear behavior, which has previously been overlooked in research. The basic limitation of a linear model, according to Anoruo (2011), is that it examines linear series, although they are nonlinear in fact. Furthermore, the linear model ignores short-term volatility and structural changes. Furthermore, linear models assume linearity in time series, even though time series is nonlinear in reality. Failure to account for intrinsic nonlinearities, according to the data, can lead to inaccurate conclusions. As a result, the primary goal of this research is to determine how pricing differences (exchange rates, trade balance, inflation, and oil prices) influence tourist arrivals. No previous research has investigated the asymmetric relationship between the variables mentioned above and visitor arrivals, as far as the researchers are aware. In this work, the nonlinear autoregressive distributed lag estimation approach was applied. As a result, this research uses this method to gain a better understanding of the impact of microeconomic variables on Bangladesh's tourism. As a result, this study will make more accurate policy suggestions to decision-makers.

Tourism in Bangladesh

Bangladesh's weather is pleasant, making it a popular tourist destination worldwide. The Ganges, Brahmaputra, and Ganges River delta are all at sea level in Bangladesh. The Ganges, Brahmaputra, and Meghna rivers and their tributaries come together to form this

delta. Natural beauty abounds in Bangladesh. Rivers, beaches, ancient sites, religious sites, hills, forests, waterfalls, and tea gardens are all nearby. Four world heritage sites in Bangladesh are Sundarban, Cox's Bazar Sea beach, the Historic Mosque in Bagerhat, and the Ruins of the Buddhists Vihara at Paharpur, among others 1007 heritage sites in the world. Many local and international tourists visit the country and its tourist attractions to admire the beauty of nature. Around six lakh (600,000) tourists visited Bangladesh in 2012 to see and appreciate its natural beauty.

Bangladesh is ranked 120th out of 140 countries in the Travel and Tourism Competitiveness Report 2019, up from 125th last year. In 2018, tourism accounted for 4.4% of Bangladesh's overall GDP. The government allocated Bangladeshi Taka 34 billion to the Civil Aviation (Biman) and Tourism Ministries, doubling the previous fiscal year's budget. As a result, Bangladesh's direct contribution to GDP will increase by 6.2% per year to Bangladeshi Taka 824.0 billion (2.1% of GDP) by 2028, according to the World Travel and Tourism Council (WTTC). Visitor exports mostly determine the direct contribution to GDP. Bangladesh's visitor exports totaled BDT 18.4 billion in 2017, with an estimated value of BDT35.8 billion in spending by international visitors.

By 2024, Bangladesh will have graduated from the Least Developed Countries (LDC) category. As a result, Bangladesh must begin seeking out other sources of foreign revenue before its primary source runs dry. The tourism industry accounts for 10.4% of the global GDP and is growing at 3.9% each year. As a result, if well managed, the tourism business can be a significant source of foreign currency revenues.

These are the only few studies that studied only the improvement of the tourism sector in the Bangladesh context (e.g., Islam, 2015; Mondal & Haque, 2017). There is no study on asymmetric or even symmetric tourism demand behavior in Bangladesh, to the best of the authors' knowledge. This study used nonlinear autoregressive distributed lag (NARDL) model by Shin et al. (2014), which can compute the error correction model (ECM) as well as long-term and short-period asymmetries to fill this gap.

Literature Review

After oil and gas, tourism is the world's third most significant industry. As a result, the tourist industry is now seen as a crucial component of increasing state revenue and the overall economy. Therefore, several studies have been conducted to determine the factors that contribute to an increase in tourism demand in a specific country.

Several studies have investigated the impact of crude oil prices on tourist arrivals (Yeoman et al., 2007; Becken & Lennox, 2012; Shaeri et al., 2016). According to some research, there is an asymmetric relationship between oil prices and tourist demand (Kisswani et al., 2020; Al-Mulali et al., 2020). Using the NARDL model, Kisswani and Harraf (2021) investigated the asymmetric effects of price variations in the oil market

on tourism demand. The authors conclude that decision-makers in the Middle East and Northern Africa (MENA) countries should pay attention to the asymmetric impact of oil prices on tourism, given that tourism is a significant contributor to GDP and a good source of jobs, and that this information can be useful in developing policies.

Furthermore, rates of exchange conversion are frequently used in research to account for the effect of relative tourism pricing (Cheng, 2012; Yap, 2012; Tang et al., 2016). Exchange rate volatility can be a separate variable in a tourism demand model since customers may react differently to real pricing differences owing to volatility (Dincer et al., 2015; Sharma & Pal, 2020). Using the ARDL model in Iceland, Agiomirgianakis et al. (2015) looked at the currency rate in relation to visitor flows. According to their findings, currency rate fluctuation has a detrimental impact on visitor arrivals.

Inflation or tourist pricing is crucial for forecasting tourism demand (Naidu et al., 2017; Shaari et al., 2018; Pektas & Unluonen, 2020; Achyar & Hakim, 2021). As measured by the price elasticity of demand, rising tourism prices have always been negatively linked to tourism demand. Inflation and the number of visitors are inversely connected, according to Hanafiah and Harun (2010).

Several recent studies have investigated the link between institutional quality and tourism (Kim et al., 2018; Usman et al., 2020). Institutional quality and political stability influence tourism demand. According to the bulk of studies, political stability is necessary for tourism development (Farmaki et al., 2015; Khan et al., 2020; Lee et al., 2020; Mushtaq et al., 2020). According to Haseeb and Azam (2021), a higher level of corruption has a detrimental influence on tourism competitiveness among nations. Ghalia et al. (2019) explored the effects of institutional quality and political risk on tourism demand. According to the authors, the absence of conflict has been proven helpful to tourism development. Therefore, the quality of an institution plays an important role in enhancing tourist traffic.

For the past decade, tourism has been seen as a source of trade balance, particularly in countries gifted with natural beauty. Moreover, the tourist sector, according to Jalil et al. (2013), is economically significant since it generates revenue, creates investment and job opportunities, and improves infrastructure. Terrorism, on the other hand, is more than a financial drain (Liu & Pratt, 2017; Meo et al., 2018).

Because of tourists' spending power, tourism demand responds asymmetrically. Bangladesh is an oil-importing country. Therefore, the relationship between oil prices and tourism demand makes sense. Tourist arrivals are thus adversely affected by rising energy prices. In addition, the quality of Bangladesh's institutions, inflation, trade balance, and exchange rates all play a role in tourist arrivals. To this date, most scholars have examined the nexus of tourism demand and its drivers in a linear framework. However, structural changes and short-term volatility cannot be studied using linear models. According to Raza et al. (2016), non-linearities, such as structural fractures and asymmetric behavior resulting

from bankruptcy or severe credit events, regularly influence market dynamics, especially when the sample period includes financial crises like the global crisis of 2007 and 2008. As a result, earlier research has shown contradictory findings.

Hence, in this study, the nonlinear framework was used in Bangladesh to fill in this gap. In addition, the nonlinear impacts of different microeconomic variables are commonly explored in the literature to study the five key mentioned above components that impact tourist arrivals. As a result, macroeconomic variables, such as the trade balance, exchange rate, institutional quality, inflation, and oil prices, are all possible sources of asymmetric tourism demand. Furthermore, this will be the first study in Bangladesh to look at the asymmetric influence of the above-mentioned microeconomic variables on tourist arrivals, to the best of the authors' knowledge. Shin et al. (2014) created a novel econometric methodology called the nonlinear ARDL technique, which allows us to look at asymmetries between study variables in both the short and long run. Tourist arrivals, the exchange rate, trade balance, inflation, institutional quality, and oil prices are among the six variables used. Yearly secondary time series data from 1995 to 2019 has been used for empirical study.

METHOD AND MATERIALS

Data Description

This research has combined key microeconomic factors to look at the asymmetric relationship in the short and long run. Yearly secondary time series data from 1995 to 2019 has been used for this empirical study. Table 1 has shown the description and sources of study variables.

Methodology

Crude oil prices, inflation, the exchange rate, the trade balance, and the quality of institutions all impacted tourist arrivals in Bangladesh and were investigated using the augmented

Table 1
Description and sources of study variables

Variables	Indicators	Description	Data sources
Tourist arrival	TA	Tourist arrival (in Thousand person)	World Development Indicators (WDI)
Oil Price	OP	Crude Oil Price (in dollar per barrel)	Statistical Review of World Energy, 2020
Inflation	INF	Consumer Price Index (in percentage of the total)	World Development Indicators (WDI)
Exchange rate	EXR	US Dollar/Bangladeshi Taka	Bangladesh Bank
Trade balance	TB	Trade balance (in % of GDP)	World Development Indicators (WDI)
Institutional quality	IQ	Index	ICRG

*Note***:** Tourist arrivals, oil prices, and the exchange rate are all expressed as logarithms.

Phillips curve methodology in this research. Ibrahim (2015), Sek (2017), and Abdlaziz et al. (2016) have all investigated an augmented Phillips curve technique. The following linear Equation 1 was proposed to investigate the influence of crude oil prices, inflation, exchange rate, trade balance, and institutional quality on tourist arrivals in Bangladesh:

$$LNTA_t = \alpha_0 + \alpha_1 LNOP_t + \alpha_2 INF_t + \alpha_3 LNEXR_t + \alpha_4 TB_t + \alpha_5 IQ_t + u_t \quad (1)$$

Where, LNTA, LNOP, INF, LNEXR, TB, and IQ represent the logarithmic of tourist arrivals, the logarithmic of oil prices, inflation, and the logarithmic of the exchange rate, trade balance, and institutional quality, respectively, and u_t is an independent and identically distributed (i.i.d.) component. This study conducted the current investigation in nonlinear settings due to nonlinearities in time series. It could be due to (a) concealed co-integration and (b) the co-integration of series components causing structural fractures and asymmetries. The nonlinear ARDL methodology employs positive and negative changes or partial sum decompositions to determine the asymmetric effects in long and short-run periods. This approach produces superior results with small samples, according to Romilley et al. (2001) and Pesaran et al. (2001). The model's nonlinear functional form of the model to investigate the impact of crude oil prices, inflation, exchange rate, trade balance, and institutional quality on tourist arrivals is as in Equation 2:

$$LNTA = f(LNOP^+, LNOP^-, INF^+, INF^-, LNEXR^+, LNEXR^-, TB^+, TB^-, IQ^+, IQ^-) \quad (2)$$

Based on the previous work of Liang et al. (2020), Ibrahim (2015), and Lacheheb & Sirag (2019), considering the asymmetric relationship between oil prices, inflation, exchange rate, trade balance, institutional quality, and tourist arrivals, the model will be as in Equation 3:

$$LNTA_t = \beta_0 + \beta_1 LNOP_t^+ + \beta_2 LNOP_t^- + \beta_3 INF_t^+ + \beta_4 INF_t^- + \beta_5 LNEXR_t^+ + \beta_6 LNEXR_t^- + \beta_7 TB_t^+ + \beta_8 TB_t^- + \beta_9 IQ_t^+ + \beta_{10} IQ_t^- + e_t \quad (3)$$

Where the $\beta_i's$ represent long run parameters and e_t is an i.i.d. component. Positive changes OP^+, INF^+,EXR^+, TB^+, and IQ as well as negative changes OP^-, INF^-,EXR^-, TB^-, and IQ respectively, account for the nonlinear influence of research variables. Positive and negative changes in their partial sums in oil prices, inflation, the exchange rate, trade balance, and institutional quality are represented by the following Equations 4-13:

$$OP_t^+ = \sum_{i=1}^{t} \Delta OP_t^+ = \sum_{i=1}^{t} max(\Delta OP_i, 0) \quad (4)$$

$$OP_t^- = \sum_{i=1}^{t} \Delta OP_t^- = \sum_{i=1}^{t} min(\Delta OP_i, 0) \quad (5)$$

$$INF_t^+ = \sum_{i=1}^{t} \Delta INF_t^+ = \sum_{i=1}^{t} max(\Delta INF_i, 0) \quad (6)$$

$$INF_t^- = \sum_{i=1}^{t} \Delta INF_t^- = \sum_{i=1}^{t} min(\Delta INF_i, 0) \quad (7)$$

$$EXR_t^+ = \sum_{i=1}^{t} \Delta EXR_t^+ = \sum_{i=1}^{t} max(\Delta EXR_i, 0) \quad (8)$$

$$EXR_t^- = \sum_{i=1}^{t} \Delta EXR_t^- = \sum_{i=1}^{t} min(\Delta EXR_i, 0) \quad (9)$$

$$TB_t^+ = \sum_{i=1}^{t} \Delta TB_t^+ = \sum_{i=1}^{t} max(\Delta TB_i, 0) \quad (10)$$

$$TB_t^- = \sum_{i=1}^{t} \Delta TB_t^- = \sum_{i=1}^{t} min(\Delta TB_i, 0) \quad (11)$$

$$IQ_t^+ = \sum_{i=1}^{t} \Delta IQ_t^+ = \sum_{i=1}^{t} max(\Delta IQ_i, 0) \quad (12)$$

$$IQ_t^- = \sum_{i=1}^{t} \Delta IQ_t^- = \sum_{i=1}^{t} min(\Delta IQ_i, 0) \quad (13)$$

Under an unrestricted error correction representation, Equation 3 can be included in the following NARDL Equation 14:

$$\begin{aligned}
&\Delta LNTA_t = \gamma_0 + \sum_{i=1}^{p} \gamma_1 \Delta LNTA_{t-i} + \sum_{i=1}^{p} \gamma_2 \Delta LNOP^+{}_{t-i} + \\
&\sum_{i=1}^{p} \gamma_3 \Delta LNOP^-{}_{t-i} + \sum_{i=1}^{p} \gamma_4 \Delta INF^+{}_{t-i} + \sum_{i=1}^{p} \gamma_5 \Delta INF^-{}_{t-i} + \\
&\sum_{i=1}^{p} \gamma_6 \Delta LNEXR^+{}_{t-i} + \sum_{i=1}^{p} \gamma_7 \Delta LNEXR^-{}_{t-i} + \sum_{i=1}^{p} \gamma_8 \Delta TB^+{}_{t-i} + \\
&\sum_{i=1}^{p} \gamma_9 \Delta TB^-{}_{t-i} + \sum_{i=1}^{p} \gamma_{10} \Delta IQ^+{}_{t-i} + \sum_{i=1}^{p} \gamma_{11} \Delta IQ^-{}_{t-i} + \theta_1 LNTA_{t-1} + \\
&\theta_2 LNOP_{t-1}^+ + \theta_3 LNOP_{t-1}^- + \theta_4 INF_{t-1}^+ + \theta_5 INF_{t-1}^- + \theta_6 LNEXR_{t-1}^+ + \\
&\theta_7 LNEXR_{t-1}^- + \theta_8 TB_{t-1}^+ + \theta_9 TB_{t-1}^- + \theta_{10} IQ_{t-1}^+ + \theta_{11} IQ_{t-1}^- + \varepsilon_t
\end{aligned} \quad (14)$$

Where p indicate the lag order and $\beta_1 = \theta_2/\theta_1, \beta_2 = \theta_3/\theta_1, \beta_3 = \theta_4/\theta_1$ and $\beta_4 = \theta_5/\theta_1$, $\beta_5 = \theta_6/\theta_1, \beta_6 = \theta_7/\theta_1, \beta_7 = \theta_8/\theta_1, \beta_8 = \theta_9/\theta_1, \beta_9 = \theta_{10}/\theta$ and $\beta_{10} = \theta_{11}/\theta_1$ are long-run asymmetric effects of crude oil prices, inflation, exchange rate, trade balance and institutional quality on tourist arrivals and ε_t is an error correction term. Accordingly, $\sum_{i=1}^{p} \gamma_i{}'s$ are measures the short run asymmetric effects of crude oil prices, inflation, the exchange rate, the trade balance, and institutional quality respectively.

Pre-testing is required for this research work to estimate Equations 14. First, this work investigated the order of integration of the selected variables using the well-known Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) tests. The NARDL technique is appropriate regardless of whether the variables are fully I (0) or I (1) integrated, or even fractionally integrated. However, according to some authors, this approach does not apply to the I (2) series because the estimators become invalid for the I (2) series. Second, this study

estimated Equation 14 using Katrakilidis and Trachanas's (2012) typical Ordinary Least Squares (OLS) approach. Third, this research used a bound testing methodology developed by Pesaran et al. (2001) and Shin et al. (2014) to evaluate the existence of a long-run relationship between variables in a co-integration test. Using the F-test, this study checks the null hypothesis of $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = \theta_8 = \theta_9 = \theta_{10} = \theta_{11} = 0$ jointly. Oil prices, inflation, exchange rates, trade balances, institutional quality, and tourist arrivals are all subjected to the Wald test to evaluate long-run asymmetry. This study uses the NARDL approach to estimate the asymmetric long-run and short-run effects of oil prices, inflation, exchange rates, trade balance, institutional quality, and tourist arrivals after determining the existence of long-run co-integration.

RESULTS AND DISCUSSION

The descriptive statistics for all the study variables are presented in Table 2. Bangladesh saw a high of 1016000 visitors, a minimum of 125000, and an average of 294000 visitor arrivals during the study period. The maximum inflation rate was 11.39517% throughout the research period, the lowest inflation rate was 2.007174%, and the average inflation rate was 6.373795%. During the study period, Bangladesh experienced a high exchange rate of 84.58 Bangladeshi taka/Dollar, a low exchange rate of 40.278 Bangladeshi taka/Dollar, and an average exchange rate of 65.30372 Bangladeshi taka/Dollar. The price of crude oil ranged from $105 per barrel to $13.05 per barrel, with an average of $53.764 per barrel over the research period. The institutional quality index in Bangladesh ranged from 2 to 5.39 over the survey period, with an average of 2.6284. According to the calculations, the skewness of tourist arrivals and institutional quality is not between -0.5 and 0.5 (not close to zero). It indicates that the data is not approximately symmetrical and that the Kurtosis is greater than three, indicating that the distribution of tourist arrivals and institutional quality is wider than the normal distribution. According to the findings, the data for the

Table 2
Descriptive statistics

	TA (Thousand person)	OP (dollar per barrel)	EXR (US Dollar / Bangladeshi Taka)	INF (%)	IQ (Index)	TB (% of GDP)
Mean	293.7600	53.76400	65.30372	6.373795	2.628400	-5.940400
Median	207.0000	52.81000	68.87500	6.194280	2.500000	-5.750000
Maximum	1016.000	105.0100	84.58000	11.39517	5.390000	-4.150000
Minimum	125.0000	13.06000	40.27800	2.007174	2.000000	-8.640000
Std. Dev.	221.8572	30.73617	13.96584	2.347536	0.736176	1.215221
Skewness	2.141649	0.359648	-0.339835	-0.035101	2.498626	-0.440069
Kurtosis	6.710256	1.855099	1.876445	2.871849	9.562608	2.240691

Note. TA, OP, EXR, INF, IQ, and TB represent tourist arrivals, oil prices, the exchange rate, inflation, institutional quality, and trade balance, respectively.

other parameters is approximately symmetrical, and the Kurtosis for all factors is less than three, suggesting that the distribution is narrower than the normal distribution.

The unit root test, also known as the stationary test, is the most important condition for time series data when looking at the order of integration of variables. The Augmented Dickey-Fuller (ADF) and Phillips–Perron (PP) tests conducted the empirical research. Table 3 summarizes the results of the study. For the best lag structure, involving intercept and linear time trend at level but eliminating time trend from the first difference, the Schwarz information criteria (SIC) was used. Except for the oil price, all variables are stationary at level, showing that they are I (0) according to the ADF test, whereas all study variables are stationary at the first difference, according to both tests' results, showing that variables are I (1). In the absence of I (2) variables, this study utilized the bound testing methodology to approximate the Equation 14. The effects of each microeconomic variable on tourism demand are depicted in Figure 1. All study factors have a substantial relationship with tourist arrivals in Bangladesh, as seen in the graph.

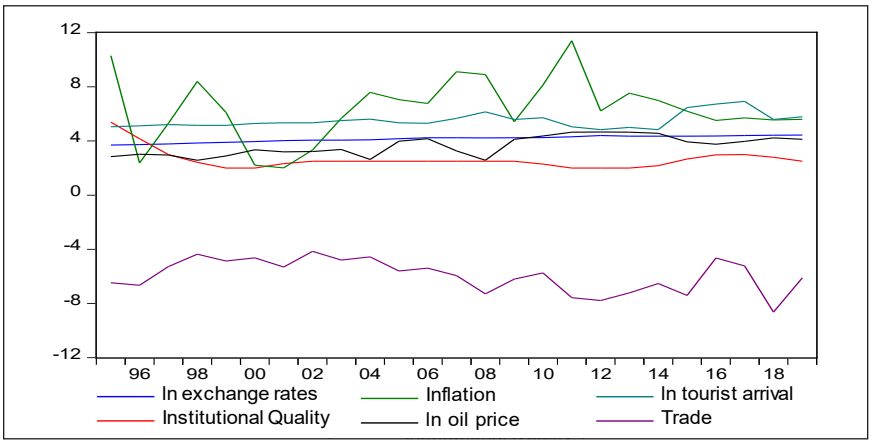

Figure 1. Tourist arrivals versus different study variables

Table 3
Unit root test results

Variables	Level		First difference	
	ADF	PP	ADF	PP
LNTA	-3.824387**	-2.572581	-4.336694**	-5.014653**
LNOP	-1.558679	-1.589572	-4.463976**	-4.451869**
LNEXR	-3.669183**	-2.536068	-4.361832**	-4.186842**
INF	-3.813030**	-3.888668**	-6.332178**	-12.67836**
IQ	-4.899241**	-5.590900**	-4.612749**	-3.199342**
TB	-3.021265**	-2.957852	-6.129287**	-9.473984**

Note. Significant at 5% levels is denoted by the symbol "**". For optimal lag, order SIC is used, and intercept and time trend are included in level, but only intercept is included in the first difference. LNTA, LNOP, LNEXR, INF, IQ, and TB represent the logarithmic of tourist arrivals, the logarithmic of oil prices, the logarithmic of the exchange rate, inflation, institutional quality, and trade balance, respectively.

The long-run connection is determined by the model's optimal lag section, according to Bahmani-Oskooee and Bohl (2000). This study used the conventional VAR model for optimal lag order selection and followed the Schwarz information criteria (SIC). Therefore, this study chose lag "1" as the optimal lag. Model estimation results for symmetric and asymmetric co-integration are shown in Table 4. Because the F-statistic result of 2.364730 is smaller than the necessary lower limit of 2.82 at 1% level, the bound test confirms no co-integration in a linear ARDL fashion. However, the F-statistic value of 10.04634 exceeds the upper critical constraint of 3.86 at a 1% level of significance, indicating co-integration for the non-linear ARDL specification.

From the NARDL results, Table 5 explains how to create long-run parameters. Oil prices, exchange rates, inflation, the trade balance, and institutional quality all have a non-linear impact on tourist arrivals, as seen in Table 5. Some diagnostic tests were also undertaken to support the NARDL model's dependability. The Jarque-Bera (J-B) test, the Ramsey RESET test, the Autoregressive Conditional Heteroskedasticity (ARCH) up to order 2 for heteroskedasticity, and the serial autocorrelation LM test up to level 2 for serial autocorrelation were all used to assess error normality. The results of all the tests are shown on the bottom panel of Table 5. The NARDL model passes all diagnostic tests,

Table 4
Bounds test results for co integration

Model specification	F-Statistic	99% lower bound	99% upper bound	Conclusion
Linear ARDL	2.364730	2.82	4.21	No co integration
Nonlinear ARDL	10.04634	2.54	3.86	Co integration

Note. The critical values are from Narayan (2005), and the SIC criterion is used for optimal lag.

Table 5
Nonlinear ARDL estimation and diagnostic test results

Variable	Coefficient	Std. Error	t-statistic
C	5.329924***	0.847211	6.291143
LNTA(-1)	-1.071399***	0.139152	-7.699467
$LNOP^{+}$	-0.033022**	0.163225	-0.202308
$LNOP^{-}$	-0.856262***	0.164730	-5.197977
$LNEXR^{+}$	-1.758631**	1.414517	-1.243274
$LNEXR^{-}$	-0.969191	5.172185	-0.187385
INF^{+}	-0.040615**	0.044209	-0.918699
INF^{-}	0.001195	0.041053	0.029106
IQ^{+}	1.909432***	0.453803	4.207627
IQ	-0.230186**	0.221506	-1.039185
TB^{+}	-0.079228	0.089249	-0.887727
TB^{-}	0.253727***	0.059858	4.238855

Table 5 (*continue*)

CointEq(-1)*	-0.971399
R^2	0.916795
J-B [*p-value*]	0.866214
R-R [*p-value*]	0.0661
LM(1) [*p-value*]	0.0942
LM(2) [*p-value*]	0.0825
ARCH(1) [*p-value*]	0.6722
ARCH(2) [*p-value*]	0.4568

Note. J-B and R-R refer to the Jarque-Bera test for error normality and the Ramsey-RESET test for model specification, respectively. The LM test is for serial correlation, and the ARCH test is for autoregressive conditional heteroskedasticity, up to the lag order given in the parenthesis. ***, ** refer to significant at 1% and 5% levels of significance, respectively. LNTA, LNOP, LNEXR, INF, IQ, and TB represent the logarithmic of tourist arrivals, the logarithmic of oil prices, the logarithmic of the exchange rate, inflation, institutional quality, and trade balance, respectively.

implying that it is reliable. The speed of adjustment (SOA) is a metric that measures how quickly companies close the difference between their prior year's leverage and their current period's desired leverage. The adjustment speed, according to the data, is -0.97, indicating a 97% increase in significance in the prior period to reaching equilibrium. Therefore, Equation 14 can be written with estimated parameters both for short and for the long run as in Equation 15:

$$\begin{aligned}\Delta LNTA_t = {} & 5.329924 - 1.071399\Delta LNTA_{t-i} - 0.018275\Delta LNOP^{+}{}_{t-i} - \\ & 0.693037\Delta LNOP^{-}{}_{t-i} - 0.137559\Delta INF^{+}{}_{t-i} - 0.028178\Delta INF^{-}{}_{t-i} - \\ & 7.160873\Delta LNEXR^{+}{}_{t-i} - 8.612820\Delta LNEXR^{-}{}_{t-i} + 0.429580\Delta TB^{+}{}_{t-i} + \\ & 0.009386\Delta TB^{-}{}_{t-i} + 2.135067\Delta IQ^{+}{}_{t-i} - 2.829846\Delta IQ^{-}{}_{t-i} - \\ & 0.07922 LNTA_{t-1} - 0.030821 LNOP^{+}_{t-1} - 0.799200 LNOP^{-}_{t-1} - \\ & 0.037908 INF^{+}_{t-1} + 0.001115 INF^{-}_{t-1} - 1.641434\mathrm{LNEXR}^{+}_{t-1} - \\ & 0.904603\mathrm{LNEXR}^{-}_{t-1} - 0.073949\mathrm{TB}^{+}_{t-1} + 0.236819\mathrm{TB}^{-}_{t-1} + \\ & 1.782185\mathrm{IQ}^{+}_{t-1} - 0.214846\mathrm{IQ}^{-}_{t-1} - 0.971399 \end{aligned} \quad (15)$$

Table 6 shows the findings of the short-run and long-run parameters. Tourist arrivals are lowered by 0.693037% for every 1% fall in crude oil prices, according to the short-run NARDL model, whereas a positive change in oil prices has no significant influence on tourist arrivals. According to the statistics, for every 1% increase in the exchange rate, tourist arrivals decrease by 7.160873% in the short run. Furthermore, tourist arrivals significantly dropped by 0.137559% for every 1% increase in inflation, according to the findings. On

Table 6
NARDL Short run and long run estimates results

Short run estimates				Long run estimates			
Variable	Coefficient	Std. Error	t-Statistic	Variable	Coefficient	Std. Error	t-statistic
$\Delta LNOP^{+}$	-0.018275	0.066339	-0.275478	$LNOP^{+}$	-0.030821**	0.129234	-0.238492
$\Delta LNOP^{-}$	-0.693037***	0.099823	-6.942675	$LNOP^{-}$	-0.799200***	0.126911	-6.297341
$\Delta LNEXR^{+}$	-7.160873***	1.025923	-6.979934	$LNEXR^{+}$	-1.641434**	0.873768	-1.878570
$\Delta LNEXR^{-}$	-8.612820	2.735347	-3.148711	$LNEXR^{-}$	-0.904603	3.301046	-0.274035
ΔINF^{+}	-0.137559**	0.026513	-5.188303	INF^{+}	-0.037908**	0.034259	-1.106522
ΔINF^{-}	-0.028178	0.021086	-1.336361	INF^{-}	0.001115	0.029331	0.038023
ΔIQ^{+}	2.135067**	0.201262	10.60838	IQ^{+}	1.782185***	0.283059	6.296151
ΔIQ	-2.829846**	0.295685	9.570491	IQ	-0.214846***	0.109707	-1.958367
ΔTB^{+}	0.429580**	0.068998	6.225959	TB^{+}	-0.073949	0.054617	-1.353960
ΔTB^{-}	0.009386	0.045804	0.204915	TB^{-}	0.236819***	0.064636	3.663878

Note. ***, ** refer to significant at 1% and 5% levels of significance, respectively. The terms "+" and "-" refer to positive and negative changes, respectively. LNTA, LNOP, LNEXR, INF, IQ, and TB represent the logarithmic of tourist arrivals, the logarithmic of oil prices, the logarithmic of the exchange rate, inflation, institutional quality, and trade balance, respectively.

the other hand, institutional quality has a significant impact on tourist numbers. According to the findings, every 1% increase in institutional quality resulted in a considerable rise in tourist arrivals of 2.135067%. Conversely, tourist arrivals fell by 2.829846% for every 1% drop in institutional quality. Finally, every 1% increase in the trade balance resulted in a considerable rise in tourist arrivals of 0.429580% in the short run, according to the findings.

Rising or declining oil prices, according to this research, have a significant and negative impact on tourism in the long run. The study's findings are consistent with Meo et al. (2018) and Hamilton & Tol (2007). Increases in oil prices are expected to raise inflation and slow economic growth. Oil prices directly impact the prices of commodities derived from petroleum products in terms of inflation. Increases in oil prices can put a damper on the supply of other items by raising the cost of production. Tourists are unable to travel anywhere, and tourist arrivals are limited as a result. Because of the influence of shipping costs, energy costs, financial instability, and the flexibility of the exchequer, fluctuations in oil prices could influence financial and tourism activities. From a microeconomic standpoint, rising oil prices result in an immediate drop in disposable income. According to the findings, tourist arrivals are reduced by 0.031% for every 1% increase in crude oil prices, and tourist arrivals are also reduced by 0.79% for every 1% decrease.

Inflation is a major predictor of tourism demand in emerging economies. International tourism is primarily influenced by internal (pricing) and foreign (global economic) trends. According to these findings, a decrease in inflation has a positive but insignificant long-term impact on tourism demand, whereas an increase in inflation, on the other hand, has a

detrimental but significant effect on tourism demand in the long run. Theoretically, inflation is linked to consumer purchasing power because, as inflation rises, tourists' purchasing power declines, and they stop visiting. They live and travel in these areas because it is too expensive to live and travel elsewhere. As inflation falls, more tourists visit the countries they stay in to take advantage of lower living and transportation costs. Tourist arrivals were reduced by 0.038% for every 1% increase in inflation, according to the findings.

According to the study's calculations, the exchange rates have the greatest impact on visitor arrivals. An increase in the exchange rate has a long-term detrimental and significant effect on tourist arrivals, while a fall in the exchange rate has the same but insignificant effect. However, compared to an increase in the exchange rate, it significantly impacts tourist arrivals. One reason for this could be the depreciation of a country's currency, making foreign travel more inexpensive. Increases in the value of a country's currency, on the other hand, will raise the cost of international tourism and reduce the number of visitors from other countries. Our findings align with those of Meo et al. (2018) and Webber et al. (2001). Tourist arrivals significantly dropped by 1.64% for every 1% increase in the exchange rate, according to the findings.

Tourism demand has a strong and positive relationship with the institutional quality. It shows that the country's tourism demand has increased because of improved institutional quality. An increase in institutional quality, according to this research, has a long-term positive and significant effect on tourist arrivals, while a fall in institutional quality has a negative but insignificant effect. Among the specific components of institutional quality, the rule of law, regulatory quality, corruption control, and voice and accountability have all been found to help the tourism industry flourish in the economy. According to the findings, tourist arrivals significantly increase by 1.78% for every 1% increase in institutional quality, but tourist arrivals are reduced by 0.21% for every 1% decrease.

The value of exported items is subtracted from the value of imported products to determine the trade balance. A positive trade balance indicates a surplus, whereas a negative value indicates a deficit. Bangladesh's trade deficit in 2019 was estimated to be at 19.76 billion dollars. Bangladesh had a trade deficit every year during the entire study period. The trade deficit has grown because of COVID-19. According to the findings, a 1% decrease in the trade balance will significantly increase tourist arrivals by 0.23%. When the trade balance is positive, it can aid in the growth of the national economy. Because tourism can contribute to a country's GDP, the government should seek to strengthen this sector. Because of this consequence, tourist arrivals in Bangladesh will increase.

As demonstrated in Table 6, the coefficient sizes of the detrimental and optimistic components of oil prices, inflation, exchange rate, trade balance, and institutional quality are not equal in the long run, indicating an asymmetric relationship. The Wald test was

used to confirm the nonlinearities between the variables under investigation. Table 7 shows the results, which demonstrate the occurrence of asymmetries between variables at a 5% level of significance. The robustness of every statistical study must be checked for parameter stability. Brown et al. (1975) suggested using the stability test for Cumulative Sum (CUSUM) and Cumulative Sum Square (CUSUMSQ) parameters devised by Brown et al. (1975). Thus, the CUSUM and CUSUM Square tests ensured that the model was stable. Figures 2 and 3 show the results of these tests and show that the NARDL model is quite stable.

Table 7
Testing the presence of asymmetric relationship (Wald test)

Variables	[*Chi-square, p-value*]	Asymmetric relationship
OP	53.10749 [0.0000]	Asymmetric relationship exist between oil prices and tourist arrivals
EXR	43.61410 [0.0000]	Asymmetric relationship exist between exchange rate and tourist arrivals
INF	6.302883 [0.0428]	Asymmetric relationship exist between inflation and tourist arrivals
IQ	35.708454[0.0000]	Asymmetric relationship exist between Institutional quality and tourist arrivals
TB	22.06879 [0.0000]	Asymmetric relationship exist between Trade balance and tourist arrivals

Note. OP, EXR, INF, IQ, and TB represent oil prices, the exchange rate, inflation, institutional quality, and trade balance respectively.

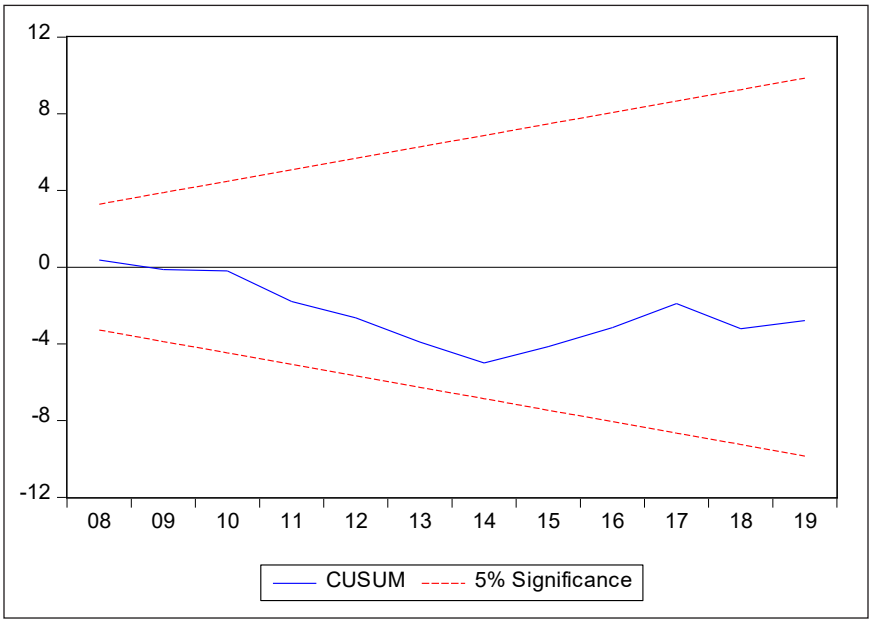

Figure 2. Model stability check using the Cumulative Sum (CUSUM) test

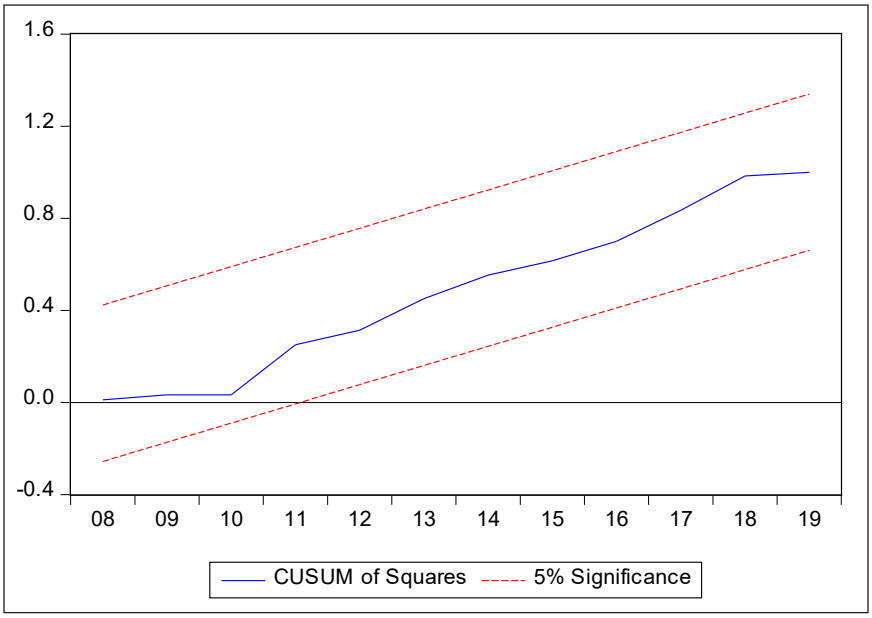

Figure 3. Model stability check using the Cumulative Sum (CUSUM) square test

CONCLUSION

All around the world, tourism is regarded as a "sunshine" industry. However, in terms of job generation, foreign exchange profits and national revenue have remained a small contributor to the region's national economy. As a result, tourism has failed to contribute much to poverty reduction in Bangladesh, even though it is a critical need in its economy. This article examines the dynamics of crude oil prices, inflation, the exchange rate, trade balance, institutional quality, and tourist arrivals in Bangladesh using annual data from 1995 to 2019. This study investigated asymmetric impacts in the long and short run using a nonlinear ARDL approach. In both the long and short terms, the findings of this study reveal that the factors analyzed have asymmetric impacts. Rising oil prices have a significant negative impact on tourist arrivals, according to long-run nonlinear results, whereas lowering oil prices has a considerable positive impact, according to the findings. Furthermore, the inflation, the exchange rate, institutional quality, and the trade balance all have a significant non-linear impact on tourism in Bangladesh.

It has been discovered that adopting a linear symmetric model to forecast Bangladesh's tourism demand could be deceiving. Tourism demand can be better understood using a nonlinear ARDL technique, which can help with forecasting and policymaking by interpreting tourist demand and several macroeconomic determinants that have nonlinear dynamics. Future research that uses an asymmetric framework and panel studies to explore additional macroeconomic variables will be the most suited.

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