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Assessing the Effects of Exchange Rates, Oil Prices and Global Uncertainty on Türkiye's Tourism Demand with a Quantile Analysis Approach*

Barış ÜLKER[a**]

[a] *Dicle University, Faculty of Economics and Administrative Sciences, Economics Department, DİYARBAKIR*
E-mail address: barisulker.dr@gmail.com, ORCID: 0000-0002-6860-8210

Abstract

Tourism is a vital sector for Türkiye's economy with its significant contributions, however, it is highly sensitive to macroeconomic and geopolitical factors. This study examines the impact of Real Effective Exchange Rates (REER), Brent crude oil prices and the World Uncertainty Index (WUI) on Türkiye's travel income from 2003:Q1 to 2024:Q3. The Quantile Autoregressive Distributed Lag model is used to analyze both short and long-run effects across different quantiles to capture heterogeneous impacts. The results indicate that both REER and oil prices affects travel incomes in the long-run at upper quantiles however, they do not affect travel incomes in the short-run at any quantiles. The effects of the REER are negative while oil prices affect travel incomes positively. WUI shows a significant impact on tourism demand neither in long-run, nor in short-run at any quantiles. These findings reveal that keeping the exchange rate competitive and monitoring oil price fluctuations is crucial to maintain sustainable tourism demand for Türkiye Also, the policies should focus on long-term as temporary changes does not create significant effects.

Keywords: Tourism Demand, Exchange Rates, Oil Prices, Global Uncertainty.

Döviz Kurları, Petrol Fiyatları ve Küresel Belirsizliklerin Türkiye'nin Turizm Talebi Üzerindeki Etkilerinin Kantil Analiz Yaklaşımı ile Belirlenmesi

Öz

Turizm, önemli katkılarıyla Türkiye ekonomisi için hayati bir değer taşımakla birlikte, makroekonomik ve jeopolitik unsurlara karşı da oldukça hassastır. Bu çalışmada Reel Efektif Döviz Kurunun (REDK), Brent petrol varil fiyatının ve Dünya Belirsizlik Endeksi'nin (DBE) 2003:Ç1-2024:Ç3 döneminde, Türkiye'nin toplam seyahat gelirleri üzerindeki etkileri araştırılmıştır. Farklı kantillerdeki uzun dönemli ve kısa dönemli heterojen etkilerin belirlenebilmesi için Kantil Otoregresif Dağıtılmış Gecikme modeli kullanılmıştır. Sonuçlara göre hem REDK hem de petrol fiyatları uzun dönemde ve üst kantillerde seyahat gelirlerini etkilerken, kısa dönemde tüm kantillerde etkisizdir. Seyahat gelirleri üzerinde REDK negatif etki gösterirken, petrol fiyatları ise pozitif etki göstermiştir. DBE ise, seyahat gelirleri üzerinde, tüm kantillerde ne kısa dönemde ne de uzun dönemde anlamlı bir etki göstermiştir. Söz konusu sonuçlar, Türkiye'ye olan turizm talebinin sürdürülebilirliği için döviz kuru rekabetçiliğinin korunmasının ve petrol fiyatı dalgalanmalarının izlenmesinin kritik olduğunu ortaya koymaktadır. Ayrıca, politikalar, değişkenlerin kısa dönemde etkisiz olduğu göz önünde bulundurularak uzun döneme odaklanmalıdır.

Anahtar Sözcükler: Turizm Talebi, Döviz Kurları, Petrol Fiyatları, Küresel Belirsizlik.

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** Corresponding author e-mail: barisulker.dr@gmail.com

INTRODUCTION

The tourism industry is very crucial for Türkiye's economy and growth. In 2023, this sector contributed $54.3 billion USD, which is 16.9% more than it was in 2022. Also, this contribution makes 5.3% of the total GDP in the same year. Meanwhile, the number of the foreign visitor arrivals reached to 57 million in 2023 marking an 11.1% increase from 2022 (TÜİK, 2024). These figures place Türkiye as the fifth among most visited country in the world in 2023 (Statista, 2025). The steady growth in both tourism revenues and the number of visitors is the key indicator that the sector's importance for the country is gradually growing.

The expansion of Türkiye's tourism sector can be traced back to the "January 24 Decisions" in 1980, which introduced wide-ranging liberalization policies. This expansion is supported by the "Tourism Incentive Law" enacted in 1982 and it became one of the key pillars of the country's economic growth process (Kanca, 2015: 2). The major downside of the tourism sector is its sensitivity to economic and politic fluctuations. Any changes in these dynamics directly impact the touristic activities. The most recent example of this vulnerability was the COVID-19 pandemic. Following the World Health Organization's declaration of a global pandemic on March 11 2020, the number of tourist arrivals fell by 65% globally in the first half of the 2020, compared to 2021 (Behsudi, 2020).

Starting from 1963 as it is the earliest data available for the tourism income, it has shown a long-term upward trend over the 1963-2024 period. The country's total tourism income was only $7.6 million US in 1963. In 1985, it surpassed the $1 billion US threshold, reaching almost $1.5 billion US, a 76% increase compared to the previous year. Türkiye's tourism income has generally grown steadily (TÜİK, 2023). There were there years in which tourism income saw a significant decrease of more than 10%. The first was in 1999, due to İzmit earthquake; the second one was 2016, due to Türkiye-Russia tension and July 15 coup attempt and the last, and the sharpest, decline was in 2020 due to the COVID-19 pandemic. However, after each decline, Türkiye's tourism income rapidly recovered. In 2024, it reached to $61.1 billion US, the highest level ever recorded (Davut & Ünal, 2025).

The role of exchange rates, oil prices and uncertainty shaping tourism demand across countries is very crucial for economic policies. As the changes in exchange rates directly effects tourism flows by changing the price competitiveness, many studies used it as main independent variable that affects the tourism demand (Agiomirgianakis et al., 2014; Crouch, 1994; Yalçın et al., 2021). Oil prices, often used as a proxy of transportation and travel costs, also shows significant effects particularly for long-haul destinations (Becken & Lennox, 2012, Hesami et al, 2020; Meo et al, 2018). Additionally, uncertainty has emerged as a crucial determinant of tourism behavior. Researches using World Uncertainty Index (WUI) and Economic Policy Uncertainty (EPU) reveal that changes in uncertainty may affect international tourism flows by changing consumer confidence and preferences on discretionary travel decisions (Akdağ et. al, 2022; Dragouni et al; 2016, Gözgör et al, 2021). These studies justify the inclusion of the REER, Brent oil prices and WUI in tourism demand models particularly for countries like Türkiye that are highly exposed to external shocks and global economic dynamics.

In this study, Quantile Autoregressive Distributed Lag (QARDL) model is employed to examine how price levels (measured by REER), oil prices (measured by Brent Crude price) and global uncertainties (measured by WUI) influence tourism demand (measured by total travel income) in Türkiye across different levels. The QARDL model is chosen for this analysis primarily due to the non-normality of tourism data arising from factors such as seasonality, sudden shocks and structural shifts in travel behavior, that undermine the reliability of traditional mean-based methods like Ordinary Least Squares (OLS). In particular, the sharp collapse in tourism demand during the COVID-19 period highlights a clear violation of the normality assumption. Unlike traditional approaches, quantile regression does not rely on normally distributed errors (Wenz, 2018: 1445). By examining different quantiles, this study explores whether the effects of key variables differ when tourism demand is low, moderate or high. Additionally, using quantile regression with the ARDL method shows short and long-run effects and calculation of error correction term (ECT) with this method reveals the speed of the adjustment of the short-run deviations to the long-run equilibrium.

The next sections of this study are organized as follow: In Section 2 conceptual framework and related literature is introduced. In Section 3, the data that used for the analysis is explained in details and QARDL model is introduced. In section 4, results of the econometric models are given and discussed. Lastly, in Section 5, conclusion and policy recommendations are made in the light of the data obtained as a result of the analyzes. This study adds to the limited body of research applying quantile regression to Türkiye's tourism sector by employing the QARDL model to capture asymmetric and distributional effects of macroeconomic variables. It also incorporates the World Uncertainty Index (WUI) to assess the impact of rising global uncertainties, offering timely insights

into tourism income dynamics under varying demand conditions.

CONCEPTUAL FRAMEWORK

Tourism demand is shaped by a broad set of factors, among which the real effective exchange rates (REER), oil prices and global economic and political uncertainties are especially prominent. The REER represents the weighted average value of a country's currency against a basket of major currencies, reflecting the relative cost of its goods and services compared to other nations. It is calculated as:

$$Q_{i,E,t} = S_{i,E,t} * \frac{P_{i,t}}{P_{W,t}}$$

where Qi,E,t is the real effective exchange rate of the country i against a basket of currencies, S_i,E,t nominal exchange of the home country, is the consumer price index of the home country and $P_{w,t}$ is the geometric mean of the price levels of home country's trading partners (Darvas, 2021). If a country's REER increases, it generally indicates the general price level of that country is also increased. This situation can cause reduction in competitiveness in global markets. On the contrary, lowering REER can strengthen the competitiveness as it reflects the decrease of the prices.

REER has been used as one of the main variables of tourism demand related studies. For example, Webber (2001) studied the effects of exchange rate volatilities on tourism demand for Australians. The results showed that in 40% percent of the cases, exchange rates affect Australian's outbound tourism preferences and their destination choices. Dritsakis (2004) also conducted similar study for German and British tourists visiting Greece and found that the changes in the real income due to the changes in REER directly affects their travel decisions. The highest elasticity is observed from the UK as 1.59%. Belloumi (2010) showed that if Tunisia's REER increases by 10%, tourism receipts to the country increases by 0.185%, which shows that tourism competitiveness improves when the local currency is stronger. Ongan et al. (2017) studied the role of the REER on the tourism demand from UK, Sweden, Spain, France and Italy to USA and revealed that it positively affects the tourism demand. Irandoust (2019) showed that, in Nordic countries, arrivals increases when REER depreciates. On the contrary, appreciation of REER decreases the number of arrivals. Both Rathnayake (2018) and Sharma and Pal (2020) revealed the negative effects of exchange rate on tourism demand in short and long run for Sri Lanka and India, respectively. Yalçın et al. (2021) showed that exchange rate appreciation negatively affects the tourism demand in countries such as France, Netherlands, Poland and Türkiye whereas the effects are symmetric for Germany, Spain and the UK. Lastly, Hüseyni et al. (2022) confirmed that exchange rate volatility negatively impacts the tourism demand on Türkiye. According to their analysis, the changes in REER above a 1.023% threshold significantly affect the tourism demand.

Tourism demand is directly and indirectly affected from global oil prices. When oil prices increase, it generally causes inflation due to increase in costs resulting reduction of travelers' real income. In terms of tourism, reduction of real income affects people destination choices, their travel frequencies and their budget for touristic attractions. Also, as oil prices go up, the costs of tourism related goods and services also increase and it negatively affects the demand further (Kisswani, et al., 2020: 501). Furthermore, oil prices directly affect transportation costs, leading to an increase in ticket prices. However, this condition does not necessarily have a negative effect on tourism demand. Fuel costs make up a larger share of operating expenses for long-haul flights. As long-haul ticket prices directly affected by the oil prices, people tend to change their plan from long-haul to short-haul vacations (Becken, 2011: 368). This is especially beneficial for the countries which are closer to the ones with high overall tourism demand as the long-haul travel demand shifts to these closer countries. Also, increasing economic activity also drives the oil demand and leads an increase in oil prices (Arezki et al., 2017). Due to increased economic activity, rising incomes may encourage people to spend more on travel and vacations, leading to greater tourism demand.

These direct effects of oil prices make it another main variable for the analysis of tourism demand. For example, Becken and Lennox (2012) built a CGE model for New Zealand. The model showed that tourism exports decline by 9% when oil prices increase by 100%. It particularly affects long-haul destinations such as the UK. Dhaoui et al. (2017) and Loganathan et al. (2018) used ARDL and threshold error-correction model (TECM) and revealed that there is bidirectional relationship between tourism demand and oil prices. According to their studies, oil-importing countries benefit from rising oil-prices and it boosts their outbound tourism demand. Heydarian et al. (2018), used ARCH model and found that GDP and tourism demand are positively affected from the oil price fluctuations. Meo et al. (2018) and Al-Mulali et al. (2020) adopted nonlinear ARDL (NARDL) model in their studies and showed that as rising oil prices directly increases travel costs and inflation, tourism demand reduces. Bozdereli and Aker (2023) showed

that rising tourism demand is positively affected from the rising oil prices. However, this impact is stronger on total revenues compared to travel-only tourism.

Economic and political uncertainties have a direct impact on a country's demand and beyond that, reinforce the idea that price level is not the sole determinant of people's purchasing behavior. Uncertainties play a crucial role on people's decisions. During the global uncertainties, people tend to postpone their discretionary expenditures. Empirical studies reveal that increased macroeconomic uncertainty leads households to notably and consistently cut back on their overall monthly expenditures over the following months (Coibion et al., 2024: 645). The World Uncertainty Index (WUI), developed by Ahir, et al. (2018), is the first panel index measuring uncertainty across developed and developing countries by analyzing the frequency of the word "uncertainty" (and its variants) in Economist Intelligence Unit (EIU) reports, with the raw counts scaled for cross-country comparability (Ahir, et al., 2018: 2). An increase in uncertainties poses several threats such as exacerbation of financial instabilities, people's and businesses' deferral of purchase or investment decision. In the tourism sector, this uncertainty can greatly affect travelers' choices and spending behavior. As tourism is mostly a discretionary activity, people mostly prioritize it when they feel themselves secure in all manners. In case of high economic and political uncertainties, tourism demand is highly impacted. Consequently, fluctuations in global uncertainty have a significant risk of leading shifts in tourism flows and revenues.

In literature, several studies have explored the impact of both economic and global uncertainty on tourism demand, highlighting different effects across countries and economic conditions. Gözgör and Ongan (2016) and Navarro-Chávez et al. (2020) revealed that as Economic Policy Uncertainty (EPU) increases, tourism demand reduces especially in developed country as people tend to postpone their vacation spending. On the contrary, EPU leads an increase in outbound tourism in emerging economies, possibly due to the migration related journeys. Nguyen et al. (2022) also showed that, in high-income economies, number of travellers increase as EPU increases however, spending per capita decreases. In low-income economies, uncertainty increases outbound travel, however lowers spending. It can be concluded that uncertainty directly affects responds to tourism sector. Both Manrique-de-Lara-Peñate et al. (2022) and Kizilkaya et al. (2024) used World Uncertainty Index (WUI) similar to this study and showed that uncertainties cause tourism demand to diminish especially when they are related to security threats and pandemic risks. Zhang et al. (2025) also emphasized that, as uncertainty rises, tourism flows are negatively impacted, and however, affordable countries can manage to offset some of these effects. Different than the above studies that found a relationship between tourism demand and uncertainties, Payne et al. (2021) couldn't find any causality relationship between the tourism demand of the U.S.'s oversea travellers and EPU. Their results revealed that uncertainty does not significantly affect outbound tourism, especially the long-term journeys.

METHODOLOGY

The aim of this study is to estimate the effects of price levels, oil prices, and global uncertainty on Türkiye's tourism demand for the period 2003:Q1–2024:Q3. For this purpose, total travel income (*trvinc*)—which aggregates marina service expenditures, foreign visitors' travel income, and citizen visitors' travel income—is used as an indicator of tourism demand. This data is obtained from the Electronic Data Delivery System (EVDS) of the Central Bank of the Republic of Türkiye (TCMB). The Real Effective Exchange Rate (REER), denoted as *reer*, serves as the indicator of price levels and is also sourced from EVDS. The global price of Brent Crude, denoted as *brent*, obtained from the Federal Reserve Economic Data (FRED) of the St. Louis Fed, represents oil prices. Lastly, the World Uncertainty Index (WUI), denoted as *wui*, serves as the indicator of global uncertainty and is obtained from policyuncertainty.com, as compiled by Ahir et al. (2018).

Before the analysis, all variables—total travel income, REER, the global price of Brent Crude, and WUI—are log-transformed and normalized, denoted as *ltrvinc*, *lreer*, *lbrent*, and *lwui*, respectively. Given that tourism data exhibits high seasonality, *ltrvinc* is seasonally adjusted using the Census X-13 method, resulting in *lstrvinc*. Census X-13 is the enhanced version of X-12 ARIMA that integrates both the X-11 methodology and SEATS (Signal Extraction in ARIMA Time Series) approach and it is preferred over TRAMO-SEATS due to its widespread use in official statistics and its strong performance in handling complex seasonal patterns, particularly in series with structural breaks or irregularities (Findley et al., 1998: 127-128).

The graphs of the normalized and seasonally adjusted series (only for *ltrvinc*) are provided below.

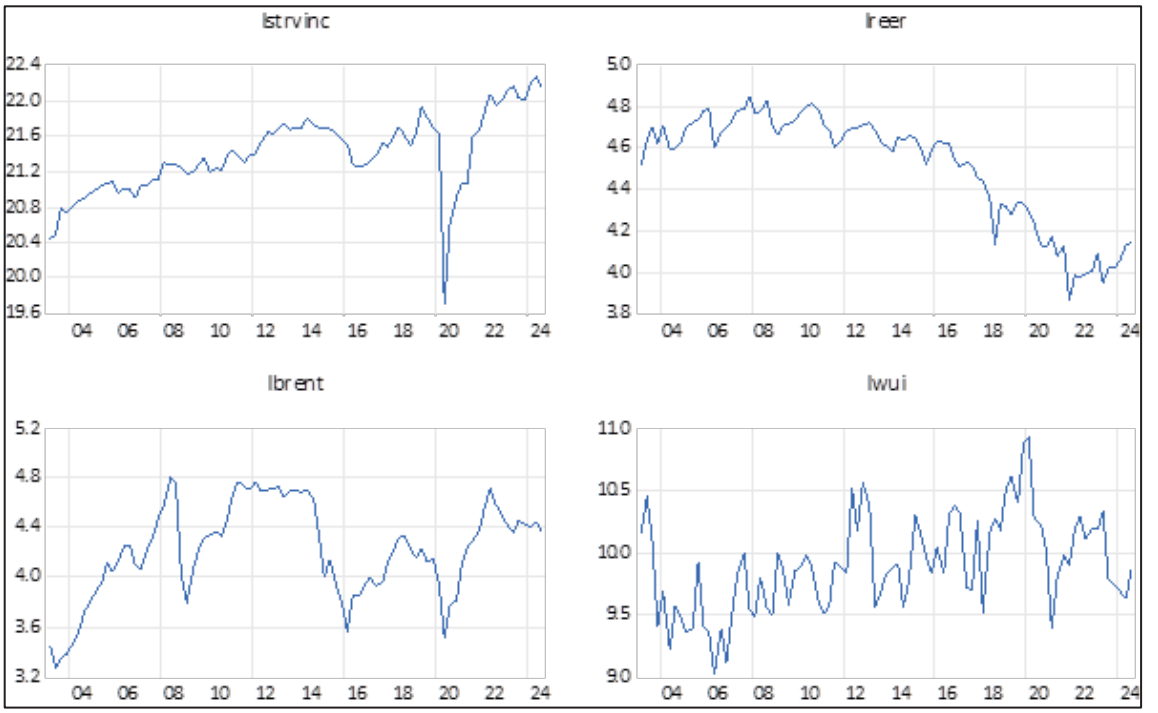

Figure 1. Graphs of *lstrvinc, lreer, lbrent* and *lwui* Variables

The variables used in the study are also summarized in a table with according to their abbreviations, definitions, descriptions and sources are given below:

The very basic assumption of the standard Ordinary Least Squares (OLS) regression the normal distribution of the variables. However, this condition is often violated by tourism data due to factors such as seasonality, economic shocks or structural brakes. These violations lead skewed and heteroskedastic distribution. Because of this reason, OLS regression is not reliable for tourism data as the assumption of normality may cause biased estimations. Koenker and Basset (1978) developed quantile regression model which quantifies the relationship among the explanatory variables and different conditional quantiles of dependent variables without the assumption of a specific conditional distribution. Instead of modelling the mean as OLS regression, quantile regression captures the effects across the entire distribution. Unlike standard regression that models the mean, quantile regression provides a more comprehensive analysis by capturing the effects across the entire distribution. Additionally, Pesaran, et al. (2001) introduced Autoregressive Distributed Lag (ARDL) model, which is a bounds-testing approach to examine the presence of a stable long-run relationship. This method remains valid regardless of whether the underlying regressors are I(0), I(1), or mutually cointegrated. Finally, Cho, et al. (2015) expanded ARDL approach by integrating it into quantile regression, to Quantile ARDL (QARDL) model, allowing for the simultaneous examination of short-run dynamics and long-run cointegrating relationships across different quantiles.

Table 1. Explanations of the Variables

Abbr.	Definition	Description	Source
lstrvinc	Total Travel Income	Normalized, Seasonally Adjusted, Nominal, in $US	EVDS of TCMB
lreer	Real Effective Exchange Rate	Normalized, CPI Based.	EVDS of TCMB
lbrent	Brent Crude Global Price	Normalized, Nominal, in $US	FRED of St. Louis Fed
lwui	World Uncertainty Index	Normalized, GDP Weighted Average	https://www.worlduncertaintyindex.com/

The classical ARDL method for this study Is defined as below:

$$lstrvinc_t = \mu + \sum_{i=1}^{p} \varphi lstrvinc_{t-i} + \sum_{i=0}^{q} \omega_i lreer_{t-i} + \sum_{i=0}^{q} \theta_i lbrent_{t-i} + \sum_{i=0}^{q} \delta lwui_{t-i} + \varepsilon_t$$

In this model, lstrvinc, lreer, lbrent and lwui represents normalized and seasonally adjusted travel income, normalized real effective exchange rate, normalized Brent Crude Oil price and normalized World Uncertainty Index, respectively. Cho, et al. (2015) introduced basic model for QARDL as below:

Above equation is reformulated for the QARDL analysis as below:

$$Q_{lstrvinc_t} = \mu(\tau) + \sum_{i=1}^{p} \varphi(\tau) lstrvinc_{t-i} + \sum_{i=0}^{q} \omega_i(\tau) lreer_{t-i} + \sum_{i=0}^{q} \theta_i(\tau) lbrent_{t-i} + \sum_{i=0}^{q} \delta(\tau) lwui_{t-i} + \varepsilon_t$$

The parameters of the above equation measure short term dynamics. This QARDL equation should be generalized as below both to capture long term relationships and to avoid serial correlation of ε:

$$Q_{\Delta lstrvinc_t} = \mu + \rho lstrvinc_{t-1} + \beta_{lreer} lreer_{t-1} + \beta_{lbrent} lbrent_{t-1} + \beta_{lwui} lwui_{t-1} + \sum_{i=1}^{p} \varphi_i \Delta lstrvinc_{t-i} + \sum_{i=0}^{q_1-1} \omega_i \Delta lreer_{t-i} + \sum_{i=0}^{q_2-1} \theta_i \Delta lbrent_{t-i} + \sum_{i=0}^{q_3-1} \delta_i \Delta lwui_{t-i} + \upsilon_t$$

When applying the model above there is still a possibility of contemporaneous correlation between $\upsilon_t, \Delta lreer, \Delta lbrent$ and $\Delta lwui$. When the projection of ν_t is employed on them with the form $\upsilon_t = \gamma_{lreer} \Delta lreer_t, + \gamma_{lbrent}(\tau) \Delta lbrent + \gamma_{lwui}(\tau) \Delta lwui_t + \varepsilon_t$, it it becomes possible to avoid correlations. Then, ε_t becomes uncorrelated with $\Delta lreer, \Delta lbrent$ and $\Delta lwui$. Generalizing above equation to the quantile regression framework directs to below QARDL – Error Correction Model (ECM):

$$Q_{\Delta lstrvinc_t} = \mu(\tau) + \rho(\tau)(lstrvinc_{t-1} - \beta_{lreer}(\tau) lreer_{t-1} - \beta_{lbrent}(\tau) lbrent_{t-1} - \beta_{lwui}(\tau) lwui_{t-1}) + \sum_{i=1}^{p} \varphi_i \Delta lstrvinc_{t-i} + \sum_{i=0}^{q_1-1} \omega_i \Delta lreer_{t-i} + \sum_{i=0}^{q_2-1} \theta_i \Delta lbrent_{t-i} + \sum_{i=0}^{q_3-1} \delta_i \Delta lwui_{t-i} + \varepsilon_t$$

The cumulative short-term impact of previous quarter of travel income on current travel income is measured by $\varphi * = \sum_{j=1}^{p-1} \varphi_j$ while the cumulative short-term impact of current and past levels of REER, Brent Oil and World Uncertainty Index on current travel income are measured by $\omega * = \sum_{j=1}^{q-1} \omega_j$, $\theta * = \sum_{j=1}^{q-1} \theta_j$ and $\delta * = \sum_{j=1}^{q-1} \delta_j$. The long-term parameters are calculated as $\beta_{lstrvinc} = \frac{\varphi lstrvinc}{\rho}, \beta_{lreer} = \frac{\omega lreer}{\rho}, \beta_{lbrent} = \frac{\theta lbrent}{\rho}$ and $\beta_{lwui} = \frac{\delta lwui}{\rho}$.

The Wald test Is employed to examine the short-term and long-term nonlinear and asymmetric effects of REER, Brent Oil, and the World Uncertainty Index on travel income. Asymptotically, the Wald test follows a chi-square distribution, and the following hypotheses for the short-term $\varphi *, \omega *, \beta *, \rho *$ and long-term parameters are tested using this approach:

$$H_0^{\varphi}: F_{\varphi} * (\tau): f \text{ versus } H_1^{\varphi}: f_{\varphi} * (\tau) \neq f \neq f$$

$$H_0^{\varphi}: S_{\omega} * (\tau): f \text{ versus } H_1^{\varphi}: f_{\omega} * (\tau) \neq f \neq f$$

$$H_0^{\varphi}: S_{\beta} * (\tau): f \text{ versus } H_1^{\varphi}: f_{\beta} * (\tau) \neq f \neq f$$

$$H_0^{\varphi}: S_{\rho} * (\tau): f \text{ versus } H_1^{\varphi}: f_{\rho} * (\tau) \neq f \neq f$$

FINDINGS

Prior to parameter estimation, the description of data given below:

Table 2. Data Description

	lstrvinc	lreer	lbrent	lwui
Mean	21.39159818	4.508705154	4.215264083	9.895613655
Median	21.38004668	4.618974467	4.236132391	9.874932716
Maximum	22.2730191	4.849762069	4.805811601	10.92746088
Minimum	19.69214825	3.863042823	3.262142344	9.016167829
Std. Dev.	0.444695416	0.268877491	0.382837948	0.38573206
Skewness	-0.573531127	-0.862226827	-0.462927125	0.242278759
Kurtosis	4.275978259	2.379396515	2.575228966	2.802823953
Jarque-Bera	10.6715372	12.17597295	3.761432405	0.992069635
Probability	0.004816207	0.002269975	0.152480859	0.608940439

According to the data description, the standard deviations indicate low variability across the sample period. The highest fluctuations are exhibited by *lreer* and *lbrent*. The skewness values show that, *lstrvinc, lreer* and *lbrent* data are negatively skewed. However, *lwui* data has slightly positive skew. The kurtosis value of *lstrvinc* shows that it exhibits leptokurtic behavior, however, the characteristic of the rest of the data is closer to normal distribution. According to the Jarque-Bera normality test results, *lbrent* and *lwui* data are normally distributed, however, normality is rejected for *lstrvinc* and *lreer* data even at 10% level.

The correlation analysis among the variables is below:

Before proceeding with the Quantile ARDL analysis, the stationarity of the variables is tested using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Although the ARDL approach can be applied regardless of whether the variables are I(0) or I(1), it is essential to ensure that none of the variables are I(2) to avoid spurious results. The models include both intercept and intercept & trend. However, given the likelihood of structural breaks in tourism-related macroeconomic data -such as those arising from geopolitical tensions or the COVID-19 pandemic- the Zivot-Andrews (ZA) unit root test (1992) is also employed to account for a single break in the intercept and in the both intercept and trend. This

Table 3. Correlation Analysis of the Data

	lstrvinc	lreer	lbrent	lwui
lstrvinc	1	-0.437294595	0.609891134	0.262757931
lreer	-0.437294595	1	-0.042755467	-0.344051773
lbrent	0.609891134	-0.042755467	1	-0.0126509
lwui	0.262757931	-0.344051773	-0.0126509	1

The analysis indicates that *lstrvinc* is negatively correlated with the *lreer*, suggesting that a stronger domestic currency reduces travel income. It is positively correlated with *lbrent*, implying that higher oil prices may signal increased global economic activity, boosting tourism income. The impact of global uncertainty is weaker but positive, while *lreer* and *lwui* show a moderate negative correlation. These results highlight exchange rates and oil prices as key drivers of Türkiye's tourism income.

helps ensure the robustness of the unit root testing, as traditional ADF and PP tests may be biased in the presence of structural changes. Including the unit root test, Schwarz Information Criteria (SIC) is adopted for all the analysis.

Table 4. ADF, PP and ZA Unit Root Test Results

		Level				First Difference	
		ADF	PP	ZA	ZA Break Date	ADF	PP
With Intercept							
lstrvinc	**t-Statistic**	-3.035**	-2.909**	-4.51***	2015:Q4	-11.274*	-11.469*
lreer	**t-Statistic**	-0.469	-0.663	-3.832*	2017:Q4	-12.164*	-12.371*
lbrent	**t-Statistic**	-3.337**	-2.645*	-5.215*	2014:Q4	-7.414*	-7.281*
lwui	**t-Statistic**	-4.355*	-4.384*	-5.941*	2020:Q4	-12.061*	-12.422*
With Intercept & Trend							
lstrvinc	**t-Statistic**	-3.926**	-3.879**	-7.215*	2020:Q2	-11.207*	-11.396*
lreer	**t-Statistic**	-0.470	-3.059	-3.283	2010:Q1	-12.182*	-12.734*
lbrent	**t-Statistic**	-3.191***	-2.541	-5.022*	2014:Q4	-7.444*	-7.303*
lwui	**t-Statistic**	-5.166*	-5.151*	-6.052**	2018:Q2	-11.994*	-12.348*

Note: *** denotes 10%, ** denotes 5% and * denotes 1% significance level.

The QARDL analysis results are presented in the table below:

Table 5. QARDL Analysis Results

	Tau	Coefficient	T-Statistic
$\mu(\tau)$	0.25	3.7142	1.4922
	0.5	5.4604	3.1113***
	0.75	6.2679	2.4958**
$\rho(\tau)$ (ECT)	0.25	-0.2097	-1.8475*
	0.5	-0.2617	-3.0991***
	0.75	-0.2888	-2.3921**
$\beta_{lreer}(\tau)$	0.25	-0.0748	-0.5196
	0.5	-0.2369	-2.8915***
	0.75	-0.2876	-2.4476**
$\beta_{lbrent}(\tau)$	0.25	0.1113	1.4872
	0.5	0.1375	2.5675**
	0.75	0.1533	2.4555**
$\beta_{lwui}(\tau)$	0.25	0.0611	1.2035
	0.5	0.0659	1.1352
	0.75	0.0664	0.8003
ω_i	0.25	-0.2425	-1.2537
	0.5	-0.0878	-0.3983
	0.75	-0.0221	-0.0717
θ_i	0.25	0.1262	1.4810
	0.5	0.1026	1.1341
	0.75	0.1514	1.7922***
δ_i	0.25	0.0430	0.9137
	0.5	0.0438	0.7879
	0.75	0.0226	0.3743

Note: * denotes 10%, ** denotes 5% and * denotes 1% significance level.

The Error Correction Term (ECT), denoted as ρ, is significant on 10% level at τ = 0.25, on 1% level at τ = 0.50 and on 5% at τ = 0.75. It confirms that the adjustment mechanism towards long-run equilibrium functions normally at all quantiles although it is marginally significant at τ = 0.25. Also, ECT coefficient should be between 0 and -1, which means that if short-term balance moves away from the long-term level, it will slowly return to that long-run equilibrium. According to the results, this condition is met at all quantiles. Short-run deviations adjust to the long-run equilibrium in in approximately 5 quarters at τ = 0.25, 4 quarters at τ = 0.50, and 3.5 quarters at τ = 0.75. The speed of adjustment is strongest in the upper quantiles. It indicates that when travel incomes are high, deviations are corrected faster. However, at τ = 0.25, the ECT is only marginally significant, suggesting that when tourism income is low, the correction significance of the correction process is weaker.

For long-term effects, the REER, with its coefficient denoted as β_{lreer}, is marginally significant at τ = 0.50 and significant at τ = 0.75 but not significant at τ = 0.25. The coefficient signs are negative for all quantiles. So, an appreciation of the Turkish Lira (higher REER) leads to lower tourism income in the long run, supporting the argument that Türkiye's price competitiveness plays a key role in attracting tourists, particularly when tourism revenues are moderate to high. When REER appreciates by 1% at τ = 0.50, travel income decreases by 0.24%, while at τ = 0.75, it decreases by 0.29%. These results are consistent with the findings of Rathnayake (2018), Irandoust (2019), Sharma and Pal (2020), and Hüseyni et al (2022). Similarly, Brent crude oil prices, their coefficient is denoted as β_{lbrent}, are significant at τ

= 0.50 and τ = 0.75 but not at τ = 0.25. The coefficients are positive for all both quantiles and as Brent crude oil increase by 1% at τ = 0.50, travel incomes increase by 0.14% and at τ = 0.75, it increases by 0.15%. These results are consistent with those of Bozdereli and Aker (2023). This probably reflects the reality that a stronger global economy tends to drive a rise in oil prices. Particularly in upper quantiles, people's desire to travel rises as the global economy strengthens. Another explanation for this association could be that long-distance travel becomes more costly as a result of rising transportation expenses brought on by rising oil prices. This could result in a substitution effect, when tourists choose Türkiye over long-distance locations because of cost savings, especially from the European, Middle Eastern, and Russia - Ukraine region. World Uncertainty Index (WUI), with its coefficient denoted as β_{lwui}, is not significant in any quantile ($p > 0.10$ across all), indicating that global uncertainty does not have a statistically meaningful long-term effect on Türkiye's tourism income. This result aligns with the findings of Payne et al. (2021). This suggests that factors like exchange rate competitiveness and global economic conditions (as reflected in oil prices) are more influential determinants of tourism demand than general global uncertainty.

Regarding short-term effects, none of the first-difference variables (Δlreer, Δlbrent, Δlwui) are statistically significant in most cases, except Δlbrent at τ = 0.75, which is only marginally significant. This suggests that short-term changes in oil prices may have a weak but noticeable immediate effect when tourism revenues are high, whereas short-run fluctuations neither in exchange rates nor in global uncertainties produce immediate, statistically significant effects on tourism income.

The Wald statistic tests results to investigate whether a variable's impact varies significantly across quantiles or remains constant is below:

Table 6. Wald Test Across the Quantiles Results

	Wald Statistic
$\mu(\tau)$	0.559
$\rho(\tau)$ (ECT)	0.244
$\beta_{lreer}(\tau)$	1.392
$\beta_{lbrent}(\tau)$	0.186
$\beta_{lwui}(\tau)$	1.031
ω_i	0.481
θ_i	0.156
δ_i	0.087

The Wald test results show that, none of the coefficients are statistically significant across the quantiles. According to the null hypothesis, these parameters remain constant across different levels of travel incomes, so we cannot reject it. These results also align with the QARDL results. As interpreted, both exchange rates and oil prices significantly affect travel income in long run, however, differentiation of these effects across quantiles is not significant. It means that, the variables may be significant at each quantile, however, their impacts are statistically stable across the distribution. These results reinforce the robustness of the relationship estimations.

CONCLUSION

This study examines the effects of real effective exchange rates (REER), Brent crude oil prices, and global uncertainty (WUI) on Türkiye's tourism income using a Quantile ARDL (QARDL) model. The findings highlight that REER negatively affects tourism income at moderate-to-high levels (τ=0.50, τ=0.75), reinforcing the importance of price competitiveness, while Brent oil prices have a positive long-term effect, likely reflecting stronger global economic activity and a shift toward short-haul travel. However, WUI is not significant, suggesting that global uncertainty does not systematically impact Türkiye's tourism demand. Short-term effects are weak, with only Δlbrent at τ = 0.75 being marginally significant, indicating that long-term fundamentals drive tourism income rather than short-term fluctuations. Additionally, Wald test results confirm that the effects of REER, Brent, and WUI remain stable across quantiles, reinforcing the robustness of the model.

Given these findings, several policy recommendations emerge to enhance Türkiye's tourism competitiveness and resilience against economic fluctuations. Firstly, as real effective exchange rates negatively affect tourism demand on upper quantile, it is crucial to maintain price competition. Policymakers should implement policies to prevent excessive appreciation of Turkish lira's value and ensure that Türkiye is an affordable travel destination. Valuable Turkish Lira and high price levels reduce the total tourism demand for Türkiye. Also, Türkiye's geographic location brings an important advantage to the country, as it is a short-distance destination for the regions with high tourism demand. The country should leverage this position to attract tourist who might otherwise would choose long-haul locations such as Thailand, Bali, the Maldives, Mexico, the Dominican Republic, the Caribbean, the Seychelles, and etc. In this manner, it is crucial to strengthen the regional airline partnerships and offer short-haul flight

packages. These can boost the demand in response to rising oil prices and travel costs. The analyze results show that, real effective exchange rates and oil prices are specifically significant on the long-term, so policies should focus to the future investments. Although the global uncertainties do not significantly impact tourism demand currently, it is prone to change as the uncertainties are rapidly increasing. So, Türkiye should focus on macroeconomic stability and political predictability. Maintaining strong international image, the travelers' confidence that plan to visit Türkiye will enhance and the country's reputation as a reliable tourism destination will be stronger. Additionally, since short-term changes do not significantly affect tourism demand, long-term planning should take priority over short-term strategies. Also, expanding domestic tourism initiatives can provide a buffer against external shocks, ensuring that the sector remains strong even during periods of global instability.

In this study, a QARDL framework is adapted to examine the effects of different macroeconomic variables on Türkiye's tourism income to make a significant contribution to the tourism economics literature. QARDL method allow researchers to understand relationship across different levels of tourism demand by capturing both heterogeneities and non-linearities. As global uncertainties are on the rise again due to the election of Donald Trump as the president of the USA, integrating WUI into the model includes an additional global dimension to the analysis. This analysis can be extended by the addition of the different risk indices, regional conflict measures or climate-related factors, which are becoming more relevant in the tourism demand. Also, using different methodologies, such as panel QARDL or time-varying parameter models or machine learning approaches may enrich the understanding of tourism demand dynamics.

In conclusion, this study underscores the importance of exchange rate competitiveness and global economic conditions in shaping Türkiye's tourism income. By adopting strategic exchange rate policies, promoting regional tourism, investing in high-value segments, and maintaining macroeconomic stability, policymakers can strengthen Türkiye's position as a leading global tourism destination. Ensuring economic resilience and adaptability to global market shifts will be key to sustaining long-term tourism growth and enhancing the country's competitiveness in the international tourism market.

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