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RENÁTA KŘEČKOVÁ

Czech University of Life Sciences Prague, Czech Republic

DANIELA ŠÁLKOVÁ

Czech University of Life Sciences Prague, Czech Republic

RADKA PROCHÁZKOVÁ

Czech University of Life Sciences Prague, Czech Republic

SERGYI YEKIMOV

Czech University of Life Sciences Prague, Czech Republic

MACROECONOMICS AND TOURISM DEMAND: EVALUATING THE ROLE OF ECONOMIC INDICATORS IN THE CZECH REPUBLIC'S HOSPITALITY INDUSTRY

Abstract:

Tourism demand plays a significant role in a country's economy and influences macroeconomic stability. Understanding the determinants of tourism demand is fundamental, especially in the context of the fast-changing global economic conditions. This study focuses on the Czech Republic and neighbouring countries and examines how selected macroeconomic variables - namely nominal exchange rates, inflation rates, GDP per capita and employee compensation - affect tourism demand as indicated by the number of guests and overnight stays in hotels and other accommodation facilities. The main aim of this paper is to assess the relationship between these macroeconomic variables and the demand for inbound tourism based on data from Germany, Austria, Poland and Slovakia and the Czech Republic over the period 2000-2022. A sub-objective is to use the results of this analysis to forecast the future development of tourism demand in the Czech Republic up to 2028. The data set was obtained from multiple sources, including the Czech Statistical Office, Eurostat, and the World Bank, ensuring reliability. The analysis was carried out using the Gauss-Markov least squares method, which allowed estimating the relationships between macroeconomic variables and tourism demand. Time series analysis, including exponential smoothing methods, was used to model and predict future trends in tourism demand. The findings show that nominal exchange rate, inflation rate and GDP per capita have a significant impact on tourism demand, with differences depending on the country of origin. For example, an increase in the inflation rate in Poland, Slovakia and the Czech Republic tends to reduce the number of tourists from these countries staying in Czech hotels, while a similar increase in Germany and Austria has the opposite effect and increases the number of tourists from these countries. These results highlighted the complexity of the relationship between macroeconomic variables and tourism demand and shown that country-specific economic policies can significantly affect tourist's flow. The study also provides a forecast of tourism recovery in the Czech Republic, predicting a return to pre-COVID-19 levels of tourist arrivals and overnight stays by the end of 2024, with continued growth through 2028. These findings are valuable for policy makers and industry stakeholders planning development of the tourism sector in the Czech Republic.

Keywords:

Tourism Demand, Macroeconomic Variables, Czech Republic, Forecasting, Exchange Rate, Inflation Rate

JEL Classification: C51, C53, L83

1 Introduction

In tourism, demand is a key factor that determines the dynamics of the sector and has a direct impact on its efficiency and growth. A deeper understanding of the impact of key historical events and analysis of current and emerging trends are essential to forecast the future trajectory of tourism. Between 2019 and 2023, the tourism industry experienced significant changes, largely driven by global disruptions such as the COVID-19 pandemic, which led to border closures, transport restrictions and a sharp decline in demand (B. Zhou et al., 2023; Nguyen-Da et al., 2023). The pandemic has highlighted the vulnerability of the tourism sector to external shocks, and therefore it is essential to study these impacts for better preparedness in the future.

Moreover, the rapid digital transformation within the tourism industry, influenced by changes in consumer behaviour, regional innovation environments and the rise of big data analytics, has created new challenges and opportunities for market participants (Kumar & Ekka, 2023). Understanding these dynamics is particularly important in the context of sustainable tourism, where there is an increasing emphasis on the protection of natural and cultural resources (Alsaifi et al., 2023). This shift towards sustainability, combined with the increasing importance of digital technologies and social media in enhancing the travel experience, requires the tourism industry to continuously innovate and adapt to evolving consumer preferences (Dai et al., 2023; Azmi et al., 2023; Hsu et al., 2023).

Tourism demand is influenced by several factors, including consumer preferences, travel consumption patterns, and external elements such as news coverage and social unrest (Martin & Martin, 2023; Wei et al., 2023). These factors shape consumer behaviour and play a critical role in determining people's willingness and ability to travel for leisure, business or other purposes (Xu et al., 2023). Tourism demand research involves understanding the interplay between consumer attributes, external factors and destination characteristics (D. Chen et al., 2024). Economic theories and empirical studies provide insights into the complex environment of tourism demand and highlight the importance of considering multiple influencing factors (Jiang, 2023).

Through a comprehensive analysis of these elements, stakeholders can better predict and forecast the demand associated with the tourism industry, which helps tourism stakeholders in decision making and strategy formulation (Botha & Saayman, 2022). Unexpected events such as the COVID-19 pandemic underscore the importance of predicting future trends in the industry. Thus, demand forecasting becomes a key aspect for the development of the tertiary sector. In this context, various studies have proposed different methods for accurate demand forecasting in the tourism industry, such as hybrid algorithms combining convolutional neural network (CNN) and long short-term memory (LSTM) (Kumar & Ekka, 2023), attention-based models and long short-term memory (Y. Li et al, 2023), statistical modelling methods and the use of COVID-19 impact indicators and prediction aggregation algorithms (D. Chen et al., 2023). These approaches aim to improve forecast accuracy, efficiency and the ability to forecast daily tourism demand (Wang et al., 2023). Such forecasts can provide vital guidance for the recovery of the tourism industry and assist in crisis planning for professionals and managers (Wu et al., 2023).

Focusing on the Czech Republic and its neighbouring countries, this paper examines the impact of macroeconomic variables such as the real exchange rate, inflation rate and GDP per capita on inbound tourism demand from Germany, Austria, Poland and Slovakia over the period 2000-2022. The study uses econometric modelling techniques to quantify these relationships and provides insights into how these variables jointly shape tourism demand. In addition, this research

aims to forecast the future trajectory of tourism demand in the Czech Republic to 2028, offering valuable guidance to policy makers and industry stakeholders as they navigate the post-pandemic period and plan for long-term growth.

2 Theoretical background

Current tourism research recognizes two basic categories of factors influencing tourism demand: rational and psychological/irrational factors. In the literature, these factors are often modelled using two distinct approaches: exit modelling, which explains the distribution of outbound tourist flows from a single source market, and arrival modelling, which focuses on aggregate tourist flows to a single destination (T. Zhou et al., 2007).

One important rational factor is the effect of inflation on tourism demand. High inflation rates can reduce the purchasing power of consumers, which reduces their ability to spend on tourism activities and consequently reduces demand. For example, in the United States, high inflation has led consumers to prioritize essential goods over discretionary spending such as travel (Engle, 2022). The relationship between inflation and economic growth has been further explored in various contexts, such as in Sri Lanka, where a negative correlation between inflation and sustainable economic development has been found (Atigala et al., 2022). Similarly, studies on household expenditure patterns during periods of high inflation have shown that core categories such as housing, transport and food are most affected, potentially changing consumer behaviour, including their spending on tourism-related activities (Taylor, 2022).

Wages, another fundamental economic variable, reflect economic and purchasing power and play a key role in tourism demand. Higher wages generally lead to increased mobility and higher tourism activity as they positively affect disposable income and thus tourism spending (Ridderstaat, 2021). Empirical studies have confirmed that increases in household income due to rising wages lead to increased tourism spending (Zha et al, 2023a; Hunga et al., 2013). Specifically, an increase in real wages tends to increase tourism expenditure, with the income effect outweighing the substitution effect (Chi, 2016). However, higher labour costs, particularly in the tourism sector, can have a negative impact on tourism expenditure by increasing the overall cost of tourism services (Philander & Roe, 2013).

Another critical factor affecting tourism demand is the exchange rate. Fluctuations in the real exchange rate can affect the price competitiveness of a destination. For example, the appreciation of a tourist's home currency can make foreign travel more affordable, which can potentially increase demand (Itskhoki, 2021). Conversely, a stronger destination currency may deter foreign tourists due to higher relative costs (Gómez-Déniz et al., 2020). Research analysing BRICS economies over the period 1980-2020 has found that currency fluctuations have a significant impact on tourist arrivals, with a stronger currency often leading to a perceived increase in destination costs (Reivan-Ortiz et al., 2023; Yan et al., 2023). In addition, geopolitical risks and economic policy stability are crucial to maintaining stable tourist arrivals, as these factors also affect exchange rates and thus tourism demand (Shi et al., 2023).

Research in behavioural economics has also highlighted the importance of psychological factors in understanding tourist behaviour. These factors, including bounded rationality and psychological effects of price perception, play an important role in tourism decision-making processes (Liu et al., 2018). For example, the illusion of money - a phenomenon where tourists perceive prices in

foreign currencies as more expensive - can influence destination choice and spending patterns (Al-Mulali et al., 2021).

Tourism demand forecasting involves capturing the complex interactions between these various factors to predict future travel behaviour patterns. Over the years, researchers have developed several methodologies to address this challenge, ranging from traditional econometric models to advanced machine learning algorithms. These approaches aim to improve the accuracy and efficiency of tourism demand forecasting, which is crucial for both crisis management and long-term planning (Jassim et al., 2023; Mariani et al., 2014). Tourism demand forecasting is typically based on aggregated data such as total tourist arrivals or expenditure, but there is a growing interest in disaggregated analyses that consider factors such as purpose of travel and country of origin. Such detailed analyses offer more granular insights and improve decision-making in the tourism industry (Jeřábek, 2019; Jassim et al., 2023).

2.1 Aim of the Research

The aim of this study is to systematically examine the impact of key macroeconomic variables, namely the real exchange rate, inflation rate and GDP per capita, on the demand for inbound tourism to the Czech Republic from Germany, Austria, Poland and Slovakia over the period 2000-2022. A secondary objective is to forecast the future trajectory of tourism demand in the Czech Republic to 2028. This research focuses on the rational economic factors influencing tourism demand, deliberately omitting psychological factors such as trends, perceptions and perceived sense of security associated with the destination.

3 Methodology and results

3.1 Methodology

The purpose of this study is to explore the impact of selected macroeconomic variables - namely the real exchange rate, inflation rate, and GDP per capita (used as a proxy for employee remuneration) - on inbound tourism demand in the Czech Republic. The analysis specifically focuses on tourists from Germany, Austria, Poland, and Slovakia over the period from 2000 to 2022, with an extension to forecast future tourism demand through 2028.

Data Collection

This study builds on the primary analysis that examined the impact of selected macroeconomic variables on tourism demand growth in the Czech Republic. The analysis uses annual time series data from 2000 to 2022 to forecast future tourism demand over the next five years. The key independent variables in this study include the real exchange rate, inflation rate and GDP per capita (used as a proxy for employee compensation). These variables were analysed in relation to the annual growth in tourism demand, represented by the number of arrivals and overnight stays in hotels and similar accommodation.

The data for this study were obtained from various reputable institutions to ensure their robustness and reliability. Primary sources include the Czech Statistical Office (CSO), Eurostat, the Ministry of Regional Development (MMR), the World Travel and Tourism Council (WTTC) and

annual reports on the economic impact of tourism. In addition, data provided by the World Bank were used, particularly in relation to macroeconomic indicators.

Given the challenges associated with the availability and accessibility of detailed economic data, this study focuses on the period 2000 to 2022, using guest and arrival numbers in mass accommodation establishments in the Czech Republic. The data has been disaggregated by country of origin, specifically focusing on Slovakia, Poland, Germany and Austria. This approach allows for a detailed examination of trends in tourism demand, which show characteristic seasonal fluctuations. It is noteworthy that periods of economic or global crises, such as the financial crisis in 2009 and the COVID-19 pandemic in 2020-2022, saw a significant decline in tourist numbers followed by a recovery in post-crisis periods.

In terms of explanatory variables, the study considers both income-related factors, such as GDP per capita, and price-related variables, specifically the inflation rate for each country. Although GDP data are usually available on a quarterly basis, this study chooses the Industrial Production Index (IPI) as a proxy for GDP to maintain analytical consistency (Jeřábek, 2019). The IPI is used in its basic index form (base 2015 = 100), which theoretically reflects the progress in value addition in different industries. This index prevents double counting of production by subtracting the contributions of one industry from another, ensuring that the level of vertical integration between industries does not bias the results.

The price dimension of tourism is measured by the real exchange rate (RER), which is defined as the ratio between the foreign price level and the domestic price level in the Czech Republic, with the foreign price level converted into domestic currency using the prevailing nominal exchange rate. For the purposes of this study, the Harmonised Index of Consumer Prices (HICP) is used as the inflation indicator. The HICP is a statistical estimate subject to sampling errors as it is based on a sample of consumer prices and household expenditure. This index represents a set of consumer price indices calculated according to a harmonised approach across the European Union.

Model Specification

To quantify the relationship between tourism demand and the selected macroeconomic variables, the study utilized an econometric model specified as follows:

$$\text{Tourism Demand}_t = \beta_0 + \beta_1(\text{Real Exchange Rate}_t) + \beta_2 (\text{Inflation Rate}_t) + \beta_3 (\text{GDP per capita}_t) + \epsilon_t$$

Where:

- Tourism Demand_t represents the number of guests or overnight stays at time *t*,
- β_0 is the intercept,
- $\beta_1, \beta_2, \beta_3$ are the coefficients for the respective independent variables, and
- ϵ_t is the error term.

This model allows for an analysis of how changes in the real exchange rate, inflation rate, and GDP per capita influence the demand for tourism in the Czech Republic.

Time Series Analysis

The study employed time series analysis techniques to examine the data over the 22-year period. Specifically, the least squares method under the Gauss-Markov theorem was used to estimate the model parameters, ensuring that the assumptions of homoscedasticity, no autocorrelation, and correct model specification were met. This approach is consistent with other recent studies that have utilized similar methods in time series analysis, highlighting their effectiveness in ensuring unbiased and efficient estimates under the Gauss-Markov conditions (Zimmerman, 2020; Barreto & Howland, 2012).

Elasticity coefficients were calculated to assess the sensitivity of tourism demand to changes in the macroeconomic variables. The elasticity formula used is:

$$\text{Elasticity} = \frac{\partial \ln (\text{Tourism Demand})}{\partial \ln (\text{Macroeconomic Variable})}$$

This formula allowed the study to measure how a 1% change in each macroeconomic variable would proportionally affect tourism demand.

For forecasting future tourism demand, exponential smoothing methods such as Brown's and Holt's double exponential smoothing were applied. These methods are particularly effective for capturing short-term trends and adapting to changes in the data, thereby providing more accurate forecasts. The accuracy of these forecasts was evaluated using the Mean Absolute Percentage Error (MAPE) metric. This approach is consistent with recent studies that have employed exponential smoothing techniques in tourism demand forecasting, emphasizing their reliability and accuracy (Elamin & Fukushima, 2018; Grifoll et al., 2021; Fatema et al., 2022).

Research Questions

This study addresses the following research questions:

1. Is there a positive association between annual tourism demand and GDP per capita (or Industrial Production Index)?
2. Does a higher inflation rate negatively impact tourism demand, including domestic residents?
3. Can the Czech Republic's tourism demand return to pre-COVID-19 level by 2025?

It is important to note that this study intentionally omits the examination of psychological factors, such as trends, perception, and the perceived sense of safety, which could also influence tourism demand. The focus is solely on rational economic factors, with the understanding that these limitations may restrict the scope of the findings. This approach is consistent with other studies in the field that have prioritized economic indicators over psychological or behavioural variables to maintain analytical clarity and focus on quantifiable data (Song & Witt, 2012; Lim, 1997; Morley,

1992). For instance, Song and Witt (2000) emphasized the importance of macroeconomic variables in forecasting tourism demand, while acknowledging the potential impact of psychological factors. Similarly, Lim (1997) conducted a comprehensive review of econometric models used in tourism demand forecasting, highlighting the predominance of economic variables in the literature. Morley (1992) also focused on price and income elasticities in tourism demand, without incorporating psychological factors into the analysis.

3.2 Comprehensive Analysis of Tourism Demand Development in the Czech Republic (2000-2022)

This section offers an integrated analysis of the historical trends and macroeconomic influences on tourism demand in the Czech Republic over the period from 2000 to 2022. The study evaluates the impact of various macroeconomic variables on tourist arrivals and overnight stays, with a particular focus on the effects of inflation, GDP per capita, and exchange rate fluctuations.

Trends in Tourist Arrivals and Overnight Stay

The data, as depicted in Tables 1 and 2, illustrate a general upward trend in the number of tourist arrivals and overnight stays in the Czech Republic. This growth is punctuated by significant fluctuations during global economic crises, notably the 2008-2009 financial downturn and the COVID-19 pandemic in 2020. The financial crisis led to a sharp decline in tourism demand, which only recovered around 2012, supported by a combination of economic stabilization and targeted marketing by Czech tourism authorities (Kadir & Karim, 2009; Zhou et al., 2023).

Table 1. Natural log of the number of guests in Czech hotels in 2000-2022 (NOG), Ln (NOG)

Year	Czech Republic	Germany	Austria	Poland	Slovakia
2000	62.4833	82.5	70.35	47.6167	40.5917
2001	66.6667	82.75	72.7583	47.9167	41.9667
2002	68	81.85	73.2417	48.7083	44.925
2003	70.5	82.275	74.7583	52.7917	51.8833
2004	77.075	84.775	79.25	59.2333	53.7583
2005	79.5167	87.6583	82.6167	62.1917	53.4333
2006	85.95	92.7	88.9167	69.8917	61.7667
2007	94.475	98.3167	94.2083	76.5	71.9917
2008	92.075	98.3333	95.5917	78.1583	82.8667
2009	80.1833	82.2417	84.6917	74.925	71.5333
2010	86.9333	91.1667	90.2417	83.2667	80.1167
2011	91.9333	97.8	96.3583	89.325	85.3333
2012	91.1167	97.4833	96.55	90.3667	88.1
2013	91.15	97.6083	97.0167	92.75	89.4583
2014	95.8	98.9167	97.9833	95.75	92.425
2015	100.15	99.75	100.0083	99.9917	99.9833
2016	103.1583	100.575	102.15	103.1583	103.4917
2017	110.1083	103.7167	108.0333	110.25	108.1333
2018	113.525	104.75	113.375	116.6333	114.3
2019	113.1	101.2833	113.4083	121.6417	115.15
2020	105.25	91.5917	106.75	119.0667	105.2583

2021	111.7667	95.825	118.575	136.6917	115.9833
2022	114.8	95.4917	126.9583	151.7333	111.5333

Source: author analysis.

Table 2. Natural log harmonized Index of Consumer Prices (HICP) on 2000-2022, Ln (HICP)

Year	Czech Republic	Germany	Austria	Poland	Slovakia
2000	4.3012458	4.37	4.3177436	4.25	4.1190914
2001	4.3455355	4.39	4.3404774	4.30	4.1881764
2002	4.3598023	4.40	4.3571574	4.32	4.2226034
2003	4.3590565	4.41	4.3700911	4.33	4.3035695
2004	4.3846274	4.43	4.3895503	4.36	4.3756417
2005	4.4001939	4.45	4.4103610	4.38	4.4031458
2006	4.4209468	4.47	4.4270896	4.40	4.4449036
2007	4.4498800	4.49	4.4488574	4.42	4.4636258
2008	4.5107679	4.52	4.4805985	4.46	4.5022327
2009	4.5167032	4.52	4.4846114	4.50	4.5114454
2010	4.5286490	4.53	4.5014102	4.53	4.5183679
2011	4.5500098	4.55	4.5363023	4.57	4.5583668
2012	4.5847123	4.57	4.5616971	4.60	4.5951030
2013	4.5985651	4.59	4.5826519	4.61	4.6096352
2014	4.6026671	4.60	4.5971548	4.61	4.6086142
2015	4.6052535	4.61	4.6051702	4.61	4.6051702
2016	4.6117319	4.61	4.6148317	4.60	4.6003419
2017	4.6356994	4.63	4.6368949	4.62	4.6141547
2018	4.6550708	4.64	4.6578733	4.63	4.6391690
2019	4.6805868	4.66	4.6726731	4.65	4.6665083
2020	4.7128281	4.66	4.6864583	4.69	4.6864506
2021	4.7453668	4.69	4.7136733	4.74	4.7142563
2022	4.8835592	4.78	4.7963414	4.86	4.8287137

Source: author analysis.

Similarly, the COVID-19 pandemic resulted in a drastic drop of over 70% in both tourist arrivals and overnight stays compared to 2019, emphasizing the sector's vulnerability to external shocks. The slow and uneven recovery observed in 2021 and 2022 highlights ongoing concerns about future waves of the virus and the long-term impact of changes in consumer behaviour (Hussain & Fusté-Forné, 2021).

Impact of Macroeconomic Variables

The study further examines the relationship between tourism demand and key economic indicators such as GDP per capita, inflation rates, and the real exchange rate, as shown in Table 3. The findings indicate a strong positive correlation between GDPs per capita and tourism demand, particularly from Germany and Austria, supporting the hypothesis that higher income levels lead to increased tourism expenditures (Chi, 2016; Matsubayashi & Inada, 2023).

Table 3. Natural log Industrial Production Index (IPI) on 2000-2022, Ln (IPI)

Year	Czech Republic	Germany	Austria	Poland	Slovakia
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2000	4.3012458	4.37	4.3177436	4.25	4.1190914
2001	4.3455355	4.39	4.3404774	4.3	4.1881764
2002	4.3598023	4.40	4.3571574	4.32	4.2226034
2003	4.3590565	4.41	4.3700911	4.33	4.3035695
2004	4.3846274	4.43	4.3895503	4.36	4.3756417
2005	4.4001939	4.45	4.410361	4.38	4.4031458
2006	4.4209468	4.47	4.4270896	4.40	4.4449036
2007	4.4498800	4.49	4.4488574	4.42	4.4636258
2008	4.5107679	4.52	4.4805985	4.46	4.5022327
2009	4.5167032	4.52	4.4846114	4.50	4.5114454
2010	4.5286490	4.53	4.5014102	4.53	4.5183679
2011	4.5500098	4.55	4.5363023	4.57	4.5583668
2012	4.5847123	4.57	4.5616971	4.60	4.5951030
2013	4.5985651	4.59	4.5826519	4.61	4.6096352
2014	4.6026671	4.60	4.5971548	4.61	4.6086142
2015	4.6052535	4.61	4.6051702	4.61	4.6051702
2016	4.6117319	4.61	4.6148317	4.60	4.6003419
2017	4.6356994	4.63	4.6368949	4.62	4.6141547
2018	4.6550708	4.64	4.6578733	4.63	4.6391690
2019	4.6805868	4.66	4.6726731	4.65	4.6665083
2020	4.7128281	4.66	4.6864583	4.69	4.6864506
2021	4.7453668	4.69	4.7136733	4.74	4.7142563
2022	4.8835592	4.78	4.7963414	4.86	4.8287137

Source: author analysis.

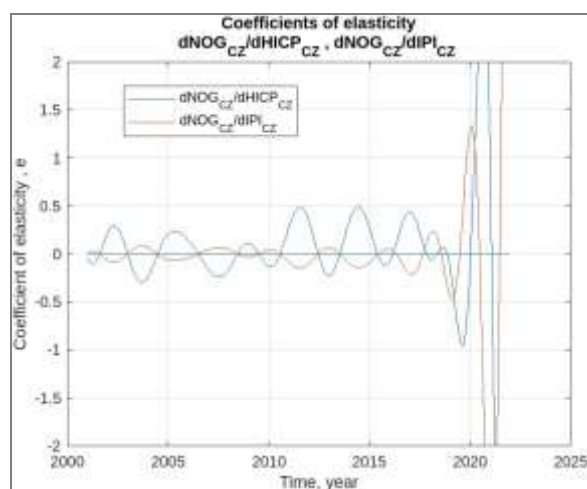
Inflation rates showed a mixed impact on tourism demand. Higher inflation in the Czech Republic, Poland, and Slovakia generally reduced the number of tourists from these countries, while tourists from wealthier countries like Germany and Austria were less sensitive to these inflationary pressures, likely due to higher disposable incomes and different spending behaviours (De Silva, 2017).

The real exchange rate also significantly influenced tourism demand. Periods of currency depreciation made the Czech Republic more attractive to tourists from neighbouring countries, particularly when the exchange rate created favourable price differentials. This is consistent with existing theories on how currency fluctuations can impact tourist behaviour (Rumaly et al., 2023; Akarsu, 2023).

Elasticity Analysis

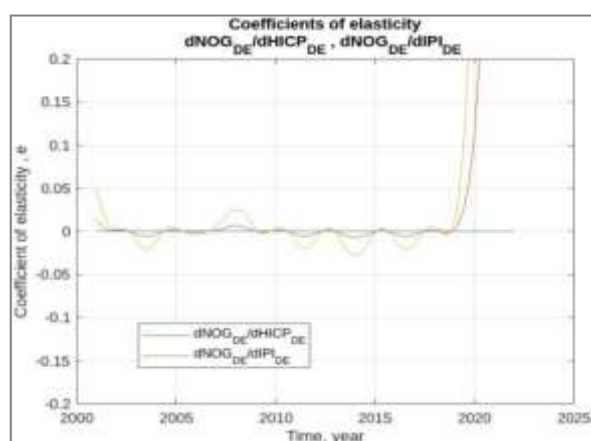
Elasticity coefficients calculated for various economic variables indicate that tourism demand's sensitivity to these factors varies across countries. Figures 1-5 highlight that inflation in Poland, Slovakia, and the Czech Republic tends to decrease tourism demand from these countries, while inflation in Germany and Austria appears to have the opposite effect, increasing the number of tourists visiting the Czech Republic. This disparity underscores the complexity of the relationship between economic variables and tourism demand, influenced by factors such as wage levels, purchasing power, and service quality expectations (Yekimov, 2021; Leontiev, 2017).

Figure 1 Coefficients of elasticity for Czech tourists



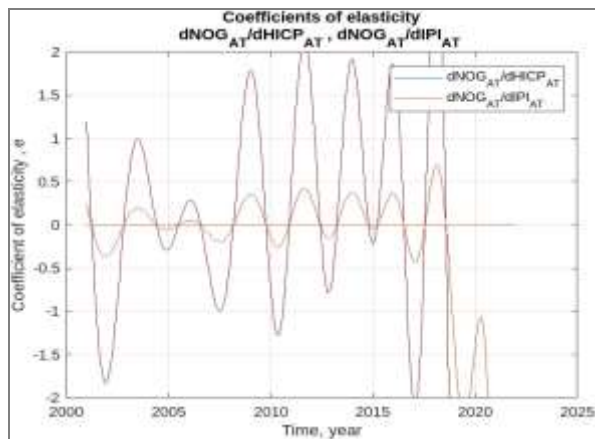
Source: author analysis.

Figure 2 Coefficients of elasticity for German tourists



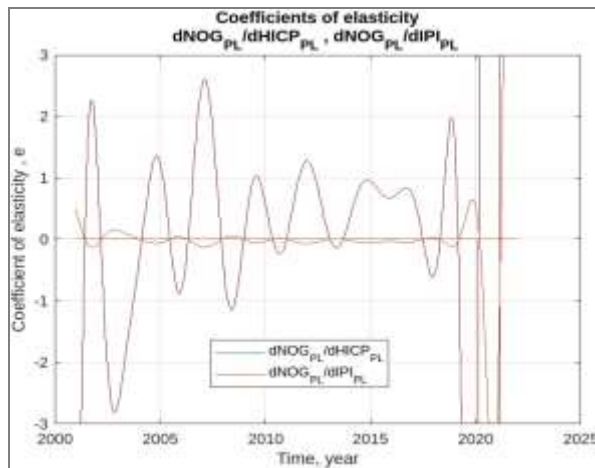
Source: author analysis.

Figure 3 Coefficients of elasticity for Austrian tourists



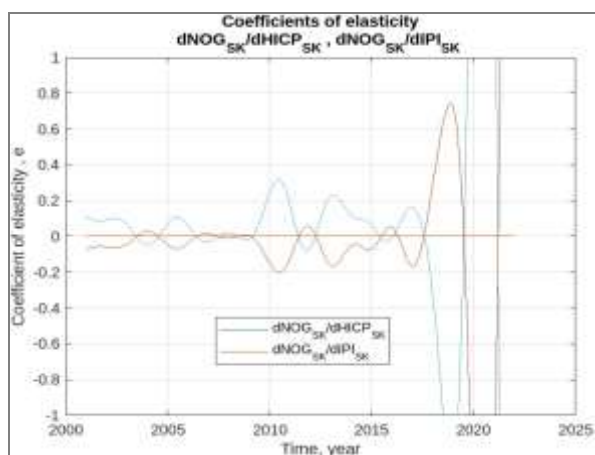
Source: author analysis.

Figure 4 Coefficients of elasticity for Polish tourists



Source: author analysis.

Figure 5 Coefficients of elasticity for Slovak tourists



Source: author analysis.

These findings reflect broader economic behaviours, where higher-income tourists from countries like Germany and Austria are less sensitive to inflation and more focused on the quality and value of services. In contrast, tourists from Poland and Slovakia are more price-sensitive, leading to shorter stays or reduced travel during economic downturns (Engle, 2022; Agag et al., 2024).

The comprehensive analysis of tourism demand in the Czech Republic underscores the critical role of macroeconomic stability in sustaining growth in the tourism sector. The varying impacts of inflation and GDP per capita across different source markets suggest that the Czech tourism industry should adopt targeted marketing and pricing strategies to mitigate the adverse effects of economic downturns, particularly in lower-income markets.

3.3 Forecasting Tourism Demand in the Czech Republic: Post-COVID-19 Recovery and Long-Term Projections

This section presents a comprehensive analysis of the tourism demand forecast in the Czech Republic from 2023 to 2028. The forecast is based on advanced time series models, specifically Brown's double exponential smoothing and Holt's double exponential smoothing. These models are particularly suited for handling time series data that exhibit trends, such as those observed in the recovery of tourism demand following significant disruptions like the COVID-19 pandemic. The forecasts are based on data provided by the Czech Statistical Office (CZSO) and are evaluated using the Mean Absolute Percentage Error (MAPE) method to ensure the reliability of the predictions (Matsubayashi & Inada, 2023; Chatfield & Yar, 2001).

Forecasting the Number of Guests

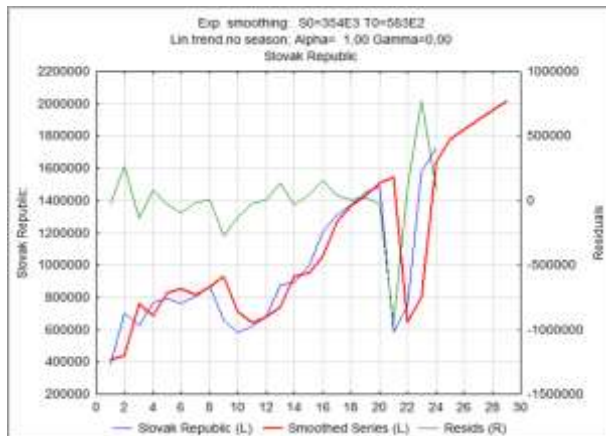
The forecasting results, presented in Table 4 and illustrated in Figures 6 to 9, indicate a robust recovery in the number of guests staying in collective accommodation establishments in the Czech Republic. The data suggest that the total number of guests will return to pre-COVID-19 levels by the fourth quarter of 2024, reflecting a significant recovery driven by both domestic and international tourism.

Table 4 Prediction of number of guests in collective accommodation establishments by country in Czech Republic

Year	Residents	Germany	Poland	Austria	Slovak Republic	Other Countries	Other Countries adj.	Total
2024	13384959	2323136	777 602	327344	899201	5439906	6502374	22539682
2025	14339185	2357097	796 130	335244	930622	5556196	6642665	23026179
2026	15361439	2391059	814 658	343144	962043	5672485	6782956	23512675
2027	16456570	2425020	833 185	351044	993463	5788775	6923248	23999171
2028	17629775	2458981	851 713	358944	1024884	5905065	7063539	24485667

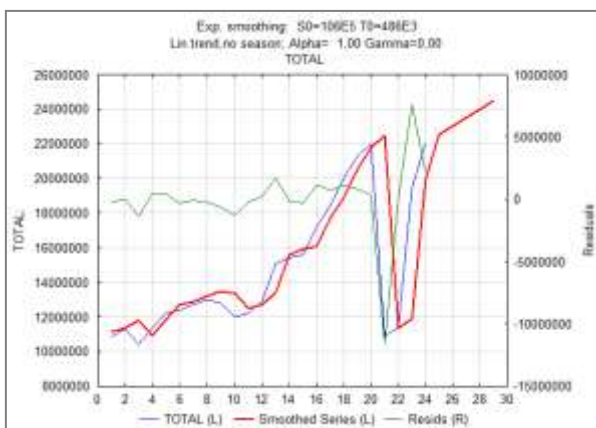
Source: author analysis.

Figure 6 Predictions: Number of guests in collective accommodation establishments by country in Czech Republic – Total



Source: author analysis.

Figure 7 Predictions: Number of guests in collective accommodation establishments by country in the Czech Republic – Slovak Republic



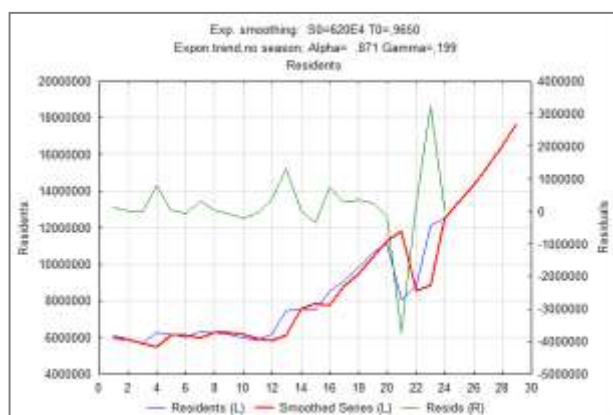
Source: author analysis.

Figure 8 Predictions: Number of guests in collective accommodation establishments by country in the Czech Republic – Other countries



Source: author analysis.

Figure 9 Predictions: Number of guests in collective accommodation establishments by country in the Czech Republic – Residents



Source: author analysis.

The forecast for international guests, particularly those from neighbouring countries such as Slovakia, also shows a positive trend. As shown in Figure 7, the number of guests from Slovakia is expected to recover fully by the end of 2024, driven by close economic and social connections between the two countries (CZSO, 2023).

Figure 9 shows a rapid return to 2019 levels in the number of resident guests, highlighting the resilience of domestic tourism in the Czech Republic. This strong performance underscores the importance of domestic tourism as a stabilizing factor during periods of global uncertainty (Polyzos et al., 2021).

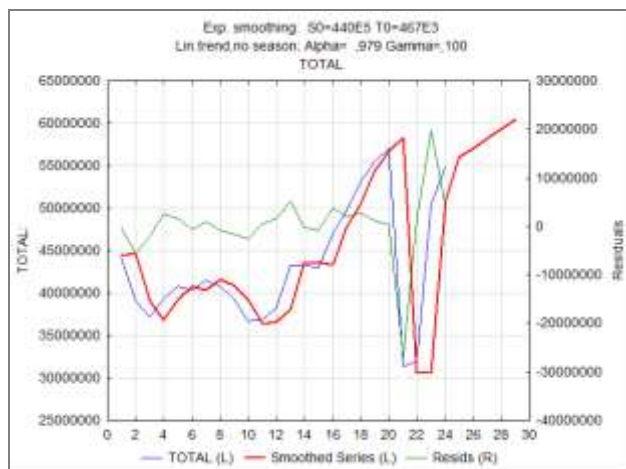
Forecasting the Number of Overnight Stays

Table 5 and Figure 10 provide forecasts for the number of overnight stays in collective accommodation establishments in the Czech Republic. The results indicate a positive development, with the total number of overnight stays expected to reach and exceed pre-COVID-19 levels by the end of 2024. This growth is particularly strong among domestic tourists, who are predicted to play a crucial role in the sustained recovery of the Czech tourism industry.

Table 5 Prediction of number of overnights in collective accommodation establishments by country in the Czech Republic

Year	Residents	Germany	Poland adj.	Austria	Slovak Republic	Other Countries adj.	Total
2024	33940927	6288918	1555408	626149,3	1783263	16524505	55971705
2025	35223774	6300111	1584782	639417,5	1841597	16792356	57089958
2026	36506622	6311305	1614156	652685,8	1899931	17060207	58208210
2027	37789469	6322498	1643529	665954	1958265	17328058	59326462
2028	39072317	6333692	1672903	679222	2016599	17595909	60444715

Figure 10 Predictions: Number of overnights in collective accommodation establishments by country in the Czech Republic – Residents



Source: author analysis.

The forecasts show that by 2025, the number of overnight stays will not only recover but also continue to grow, reflecting the Czech Republic's attractiveness as a destination for both short and long-term stays. This trend is supported by the increasing demand for quality accommodation and the country's diverse cultural and natural offerings (Kadir & Karim, 2009).

While the forecasting models used in this study provide valuable insights into the expected recovery and growth of tourism demand in the Czech Republic, it is important to acknowledge certain limitations. The accuracy of these forecasts depends on the stability of macroeconomic conditions and the absence of unforeseen global events, such as new pandemics or significant economic disruptions, which could alter tourism demand trajectories.

Furthermore, the differences in recovery rates between domestic and international tourism highlight the need for tailored marketing strategies. The strong recovery in domestic tourism suggests that efforts to promote the Czech Republic as a safe and attractive destination should continue to focus on both domestic and nearby international markets.

4 Discussion

Our study focused on the impact of various macroeconomic factors such as the nominal exchange rate, inflation rate, GDP per capita and employee compensation on tourism demand, measured mainly by the number of overnight stays in hotels and similar accommodation facilities. The findings are consistent with existing research, which often uses econometric models to examine these causal relationships, using variables such as the number of tourist arrivals or the number of overnight stays as dependent variables and factors such as GDP per capita, inflation rate or exchange rate as independent variables. For example, Indrová et al. (2015) conducted an empirical analysis of the factors influencing international tourism demand in the Czech Republic, analysing data from 38 countries between 2000 and 2012. This study used a dynamic panel data model that accounted for repeat visits and revealed that tourism demand to the Czech Republic is income and price inelastic in the short and long run. This suggests that neither income levels nor

price changes significantly affect the volume of tourists visiting the country, which may indicate the strong and stable attractiveness of the Czech Republic as a tourist destination that is less sensitive to economic fluctuations (Indrová et al., 2015). Similarly, Vojtko and Soukup (2018) examined the impact of exchange rates on tourism demand and highlighted the importance of exchange rates as a determinant in tourism demand analysis. Their study, which used a generalized linear model, found significant differences in the sensitivity of international tourism demand from the euro area to the Czech Republic to exchange rate fluctuations. This sensitivity highlights the role of exchange rate management in tourism strategies, particularly in maintaining competitiveness in the Eurozone market (Vojtko & Soukup, 2018). Furthermore, Jeřábek (2019) examined the impact of various macroeconomic factors such as GDP, real exchange rate and travel costs on inbound tourism demand from Poland, Slovakia, Germany and Austria. His study used a Vector Error Correction Model (VECM) cointegration analysis approach to identify long-run relationships between these variables and tourism demand. The study highlighted that GDP per capita, and the real exchange rate are important determinants of tourism demand, especially from neighboring countries, underscoring the need for stable economic conditions to support the tourism sector (Jeřábek, 2019).

The short-term impact of the COVID-19 pandemic on domestic tourism demand was investigated by Falk et al. (2023), who analyzed data from 65 regions in Austria, the Czech Republic, Germany and Switzerland during the 2020 summer season. Their findings, based on dynamic panel data estimation, showed significant negative short-term effects of the pandemic on domestic tourism demand. This underscores the vulnerability of the tourism sector to global crises and highlights the importance of crisis management and resilience planning (Falk et al., 2023). Our findings further suggest that the choice between real and nominal exchange rates in conjunction with relative prices can lead to mixed results in forecasting tourism demand. These different model choices highlight the complexity of economic interactions and the potential risks of relying on a single model for policymaking. The decision on whether to use levels or per capita values may also produce different results, which may influence policy recommendations and strategic decisions. In addition, the choice of the appropriate variable to serve as a proxy for tourism demand - whether it is arrivals or expenditure - is crucial, given their different relationships with the explanatory variables. For example, GDP per capita has emerged as the most influential factor when using arrivals as a proxy for tourism demand, followed by exchange rate and inflation. This suggests that although GDP per capita is generally an exogenous factor, its influence may vary depending on the countries of origin of tourists. The implementation of policies aimed at diversifying the range of countries of origin could reduce dependence on specific markets, thereby stabilizing tourism demand (Song & Li, 2008; Witt & Witt, 1995).

Finally, although there has been a decline in tourism spending both per capita and per GDP, policies aimed at increasing price competitiveness remain essential. Given that tourists' spending decisions in the Czech Republic are strongly influenced by price, maintaining or improving the price competitiveness of Czech tourism should be a priority for policy makers (Dwyer, Forsyth & Rao, 2000; Gooroochurn & Sinclair, 2005).

5 Conclusion

This study provided an in-depth analysis of the impact of key macroeconomic determinants such as the nominal exchange rate, inflation rate, GDP per capita and employee compensation on

tourism demand in the Czech Republic. Our research employed a quadratic model based on the Gauss-Markov theorem and used a large dataset covering the years 2000 to 2022 with forecasts up to 2028. The results have important implications for both theoretical understanding and practical applications in tourism economics. The analysis found that nominal exchange rates, inflation rates and GDP per capita are significant predictors of tourism demand as measured by the number of overnight stays in hotels and similar accommodation. Specifically, our findings shown that tourism demand from Poland, Slovakia and the Czech Republic is negatively affected by an increase in the inflation rate, while tourism demand from Germany and Austria shows a positive correlation with inflation in these countries. This indicates that tourists from higher income countries may be less sensitive to inflationary pressures, mostly because of their stronger purchasing power. The relationship between exchange rates and tourism demand is significant, with exchange rate fluctuations affecting the number of tourists arriving in the Czech Republic. A favorable exchange rate tends to attract more tourists from countries with currencies weaker against the Czech crown. Higher GDP per capita and higher employee compensation have been associated with increased tourism demand, underlining the importance of economic prosperity in driving tourism flows.

Theoretically, this study contributes to the growing literature on the macroeconomic determinants of tourism demand by highlighting the differential effects of inflation and exchange rates, which can vary significantly depending on the country of tourists' origin. The findings challenge the notion that all tourists respond to economic variables in the same way and instead explains that economic behavior in tourism is highly context dependent. In practical terms, the results have important implications for policy makers and stakeholders in the tourism sector in the Czech Republic. Understanding the differential impacts of inflation and exchange rates on different source markets can inform targeted marketing strategies and economic policies aimed at stabilizing and growing tourism demand. For example, maintaining a competitive exchange rate and controlling inflation could help attract more tourists from both high-income and emerging markets. While this study offers valuable insights, it also highlights several areas for future research. First, the study intentionally omitted psychological factors such as traveler perceptions, trends, and perceived destination safety. Future research could include these elements to provide a more comprehensive understanding of the factors influencing tourism demand. In addition, examining other key performance indicators (KPIs) such as average daily rate (ADR) and revenue per available room (RevPAR) could offer further insight into the economic performance of the tourism industry. In addition, extending the analysis to other regions or countries could help to generalize the findings and provide a broader view of the macroeconomic determinants of tourism demand. Longitudinal studies that track these variables over a longer period could also help identify new trends and potential changes in tourism dynamics.

The study contributes to tourism economics by elucidating the complex relationships between macroeconomic variables and tourism demand. The results complement to our theoretical knowledge and offer practical insights which can guide decision-making process in the tourism sector. Since the recovery of the sector from the impact of the COVID-19 pandemic is still not completed, the results of this study provide a timely and relevant basis for further research and policy development. The potential for future developments in this area is enormous. By integrating economic analysis with behavioral insights and advanced forecasting techniques, future studies can provide even more sophisticated and actionable recommendations for tourism stakeholders, helping to ensure the sustainable growth and resilience of the tourism sector in the Czech Republic and beyond.

Limitations

This study has several limitations that should be acknowledged to provide context for the findings and its application. First, the analysis primarily focuses on macroeconomic factors such as the nominal exchange rate, inflation rate, GDP per capita, and employee remuneration, while intentionally omitting psychological and behavioral variables like traveler perception, trends, and perceived safety. These factors can significantly influence tourism demand, particularly in the context of sudden global events such as pandemics or geopolitical tensions. Additionally, the study relies on historical data from 2000 to 2022, which may not fully capture the rapidly changing dynamics of the post-COVID-19 tourism landscape. The use of models, while robust, also comes with inherent limitations, such as the assumption of linear relationships and potential model misspecifications. Finally, the geographic focus on the Czech Republic and a few neighboring countries limits the generalizability of the findings to other regions with different economic and tourism structures. Future research could address these limitations by incorporating a broader set of variables, including psychological and behavioral factors, and by applying the analysis to more diverse set of destinations.

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