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REGIONAL TOURISM PATTERNS IN SICILY

TIPARE REGIONALE ALE TURISMULUI ÎN SICILIA

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Abstract *Studiul examinează tiparele turismului din Sicilia în contextul mai larg al disparităților regionale din Italia. Analiza se bazează pe o evaluare comparativă a principalilor indicatori economici și turistici la nivelul NUTS 2, PIB-ul, sosirile și înnoptările turiștilor. Sicilia este analizată atât ca parte a sistemului regional italian, cât și ca studiu de caz distinct, datorită poziției sale geografice, patrimoniul cultural și dependenței economice de turism. A fost estimat un model econometric log liniar pentru Sicilia folosind date anuale pentru perioada 2013-2023, având înnoptările ca variabilă dependentă și sosirile ca variabilă independentă. Rezultatele indică o elasticitate semnificativă statistic, modelul explicând 98,5% din variația cererii turistice. Testele de diagnostic confirmă absența multicoliniarității, normalitatea reziduurilor și homoscedasticitatea, deși reziduurile prezintă o anumită autocorelație. Rezultatele evidențiază robustețea relației dintre sosirile de turiști și înnoptările în Sicilia și subliniază importanța comparațiilor regionale pentru înțelegerea dinamicii turismului în Italia.*
Key words: *turism în Sicilia, cererea turistică, disparități regionale, regiuni.*
JEL CLASSIFICATION: Z32, C22, R11

INTRODUCTION

Italy has a diverse regional structure, with noticeable differences in economic development, population dynamics, and tourism activity across its twenty regions. At the NUTS 2 level, these differences are especially visible between the more developed northern regions, such as Lombardia, Veneto, and Emilia-Romagna, and the southern and island regions, which still face various structural challenges. In this context, tourism plays an important role, as it can influence regional development by contributing to job creation, income, and overall economic growth.

Sicily, the largest island in the Mediterranean, represents a particular case within the Italian regional system. Due to its geographical position, rich cultural heritage, and natural attractions, it is one of the main tourist destinations in southern Italy. However, despite its tourism potential, the region also faces several issues, such as lower economic performance, strong seasonality, and infrastructure limitations. These aspects make Sicily a relevant case for analyzing tourism both in comparison with other Italian regions and through an econometric perspective over time.

Understanding how tourism demand changes over time is important for evaluating its impact on regional development. Indicators such as tourist arrivals and overnight stays help describe the intensity and stability of tourism activity, while comparisons between regions highlight existing disparities and possible areas for improvement. In this context, econometric models, especially log-linear models based on time series data, are useful tools for analyzing the relationship between these variables and for measuring how overnight stays respond to changes in tourist arrivals.

This study combines a comparative analysis of tourism and economic indicators across Italian regions with a more detailed econometric analysis for Sicily, covering the period 2013-2023. By using

regional data and econometric methods, the paper aims to provide a clearer understanding of tourism patterns in Sicily and to place them within the broader context of regional differences in Italy.

CORE CONTENT

Tourism demand has been widely studied in the economic and tourism literature, particularly through quantitative and econometric approaches (Witt&Witt, 1995; Camara et al., 2022). Early research shows that tourism demand is typically explained by factors such as income, prices, and exchange rates (Witt & Witt, 1995), findings that remain central in contemporary studies (Rookayyah et al., 2024). At the same time, econometric and time-series models have become some of the most commonly used tools for analysing and forecasting tourism demand (Song & Li, 2008).

A significant part of the literature focuses on how tourism demand is measured. Tourist arrivals and overnight stays are among the most frequently used indicators, as they reflect both the volume of tourism flows and the intensity of tourist activity in a destination (Scotti et al., 2024). Overnight stays are particularly relevant because they also capture the duration of stay, which is an important aspect when evaluating the economic impact of tourism (Hateftabar, 2021).

Another important topic in the literature is the estimation of tourism demand elasticities. Even though the relationship between tourism variables may seem intuitive, studies show that it varies depending on the destination, model specification, and data used (Peng et al., 2015). For this reason, the relationship between tourist arrivals and overnight stays needs to be tested empirically. Log-linear models are frequently used in this context because they allow coefficients to be interpreted as elasticities, providing a clear measure of responsiveness (Peng et al., 2015).

The literature also highlights the importance of regional and spatial approaches in tourism analysis. Tourism activity is not evenly distributed across regions and is strongly influenced by local economic conditions, accessibility, and territorial characteristics (Costantino et al., 2023). In the case of Italy, regional disparities are well documented, especially between the more developed northern regions and the less developed southern regions (Costantino et al., 2023). These differences are also reflected in tourism performance and development patterns.

Within this context, Sicily represents a particular case. The region is often described as having high tourism potential due to its natural resources and cultural heritage, but also as facing structural challenges such as seasonality and infrastructure limitations (Cuccia et al., 2011). Research shows that tourism in Sicily is strongly affected by seasonal patterns, especially in areas where tourism is concentrated around coastal and cultural attractions (Cuccia et al., 2011).

However, despite the extensive literature on tourism demand and regional disparities, relatively few studies focus specifically on the relationship between tourist arrivals and overnight stays at regional level, particularly in the case of Sicily. Overall, the literature suggests that tourism demand can be effectively analysed using econometric models, that arrivals and overnight stays are key indicators, and that regional disparities play an important role in shaping tourism dynamics. These insights support the approach of this study, which combines a regional perspective with an econometric analysis of tourism demand in Sicily.

RESEARCH METHODOLOGY AND ANALYSIS OF ECONOMIC AND TOURISM INDICATORS AT THE REGIONAL LEVEL IN ITALY

The research integrates the methodological approach, the analysis of economic and tourism indicators, and the econometric model applied to Sicily, it also includes a comparative regional analysis across Italian regions, based on graphical representations of Gross Domestic Product (GDP). Tourist arrivals, and nights spent in accommodation establishments. For Sicily, a simple log-linear econometric model was estimated for the period 2013-2023, with overnight stays (LNIGHTS) as the dependent variable and tourist arrivals (LNARRIVALS) as the independent variable. Both variables were log-transformed, allowing the coefficient to be interpreted as an elasticity that is, the percentage change in overnight stays associated with a 1% change in arrivals. The logarithmic transformation

also stabilizes variance in the time-series data. All data were obtained from Eurostat's NUTS 2 regional statistics, ensuring consistency and comparability.

The model uses night spent as the main indicator of tourism demand and arrivals as a proxy for tourist flows. Although not included in the econometric specification, regional GDP at current market prices is incorporated into the graphical analysis to provide economic context for the Italian regions. The log-linear model for Sicily is expressed as LNIGHTS = $\beta_0 + \beta_1 LNARRIVALS + \varepsilon$, where LNIGHTS is the logarithm of overnight stays, LNARRIVALS is the logarithm of tourist arrivals, and β_1 represents the elasticity of overnight stays with respect to arrivals and ε is the error term capturing unexplained variation in the dependent variable.

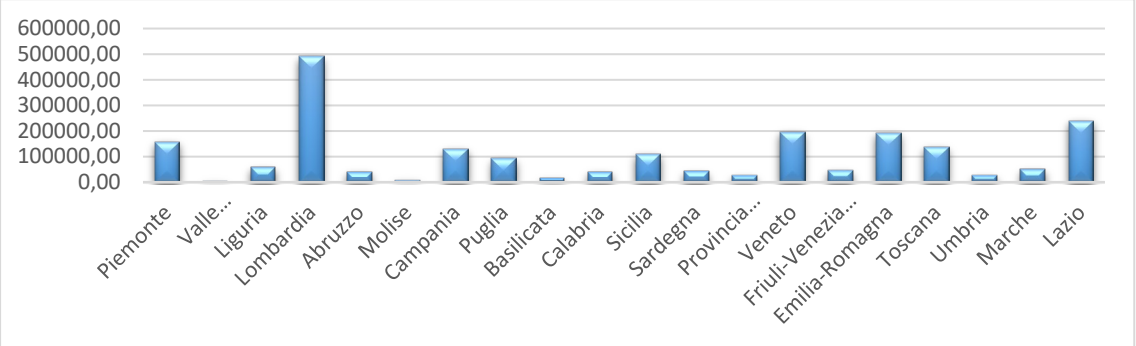


Figure 1. Gross Domestic Product (GDP) at current market prices by NUTS 2 region in Italy, 2023

Source: Author's own processing (Eurostat, 2025)

The regional distribution of GDP in 2023, measured in million euros, highlights substantial economic disparities across Italy. Lombardia leads with €490,132 million, followed by Lazio (€238,561) and Veneto (€197,137), confirming the dominance of northern and central regions. At the lower end, Valle d'Aosta (€5,698), Molise (€7,750), and Basilicata (€14,704) reflect limited economic output. With €110,159 million, Sicily economic output is still far below that of the northern regions, reflecting long-standing structural disparities in regional economic capacity.

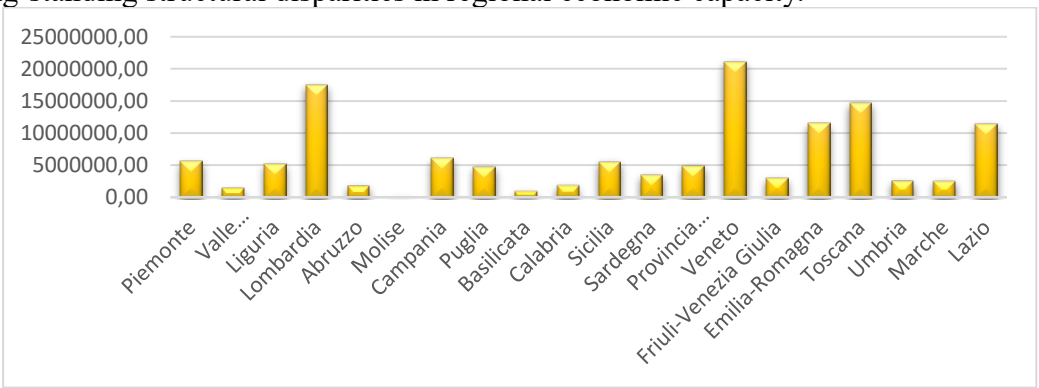


Figure 2. Arrivals at tourist accommodation establishments by NUTS 2 region in Italy, 2023

Source: Author's own processing (Eurostat, 2025)

In 2023, Veneto recorded the highest number of tourist arrivals among Italian regions followed by Lombardia, Toscana, and Emilia-Romagna. Sicilia registered over 5.5 million arrivals, placing it among the top-performing southern regions. In contrast, Molise and Basilicata showed minimal tourist inflows, highlighting strong regional disparities in tourism demand.

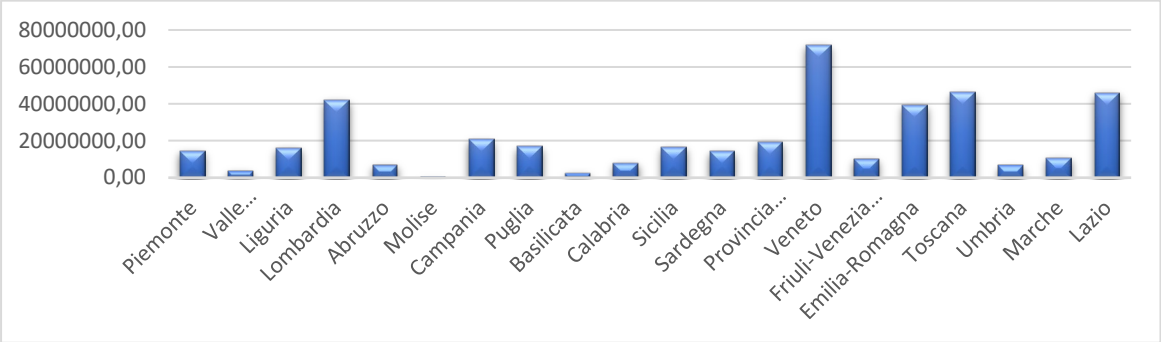


Figure 3. Nights spent at tourist accommodation establishments by NUTS 2 region in Italy, 2023

Source: Author's own processing (Eurostat, 2025)

The distribution of overnight stays across Italian regions in 2023 reveals marked territorial contrasts. Veneto dominates the national landscape with 71.9 million nights spent in accommodation facilities, while Toscana, Lazio, and Lombardia also report substantial volumes. Sicily exceeds 16.4 million overnight stays, indicating a solid level of tourism activity. In comparison, Molise and Basilicata register considerably lower figures, highlighting the uneven intensity of tourism flows across the country.

RESULTS AND INTERPRETATION

This chapter presents the empirical results obtained from the econometric analysis conducted for Sicily and provides and interpretation of the main findings. The log-linear model specified in the previous chapter was estimated using EViews 12 Student Version Lite, based on annual data for the period 2013-2023.

Table 1. Least Squares Method

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.138869	0.621513	1.832415	0.1001
LNARRIVALS	0.999096	0.040680	24.55988	0.0000
R-squared	0.985299	Mean dependent var		16.40105
Adjusted R-squared	0.983665	S.D. dependent var		0.267241
S.E. of regression	0.034156	Akaike info criterion		-3.752817
Sum squared resid	0.010499	Schwarz criterion		-3.680472
Log likelihood	22.64049	Hannan-Quinn criter.		-3.798420
F-statistic	603.1877	Durbin-Watson stat		0.463235
Prob(F-statistic)	0.000000			

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The log-linear regression model estimates the relationship between overnight stays (LNIGHTS) as the dependent variable and tourist arrivals (LNARRIVALS) as the independent variable using the Least Squares Method. The coefficient of LNARRIVALS is statistically significant ($\beta = 0.999$, $p < 0.001$), indicating a strong positive association between tourist arrivals and overnight stays. The model explains approximately 98.5% of the variation in the dependent variable ($R^2 = 0.985$), suggesting an excellent overall fit. However, the Durbin-Watson statistic (0.46) indicates the presence of positive autocorrelation in the residuals, which may affect the reliability of statistical inference.

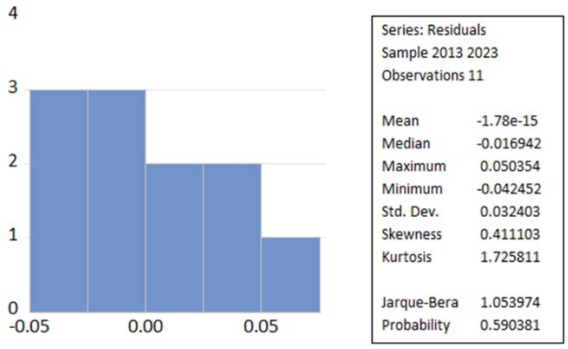
Table 2. Variance Inflation Factors Test (VIF)

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.386278	3642.248	NA
LNARRIVALS	0.001655	3642.248	1.000000

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The centered Variance Inflation Factor (VIF) for LNARRIVALS is equal to 1.00 indicating the absence of multicollinearity in the model. This confirms that the explanatory variable is not linearly correlated with other regressors. Although the uncentered VIF value is relatively high due to the presence of the intercept term, it does not affect the assessment of multicollinearity. Overall, the model does not exhibit multicollinearity issues.

Table 3. Residual Normality Test



Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The residual exhibit approximate normality. The skewness value (0.41) indicates a mild right skewness, while the kurtosis value (1.73) suggests a flatter distribution compared to the normal benchmark of 3. The Jarque-Bera statistic (1.05) and its associated p-value (0.59) exceed the 0.05 significance level, indicating that the null hypothesis of normally distributed residuals cannot be rejected. The residuals can be considered approximately normally distributed, satisfying one of the key assumptions of the linear regression model.

Table 4. Heteroskedasticity - Test of Residuals

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	0.172244	Prob. F(2,8)	0.8448
Obs*R-squared	0.454117	Prob. Chi-Square(2)	0.7969
Scaled explained SS	0.110322	Prob. Chi-Square(2)	0.9463

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The results of the White Test indicate no evidence of heteroskedasticity. The p-values associated with the F-statistic (0.8448). Obs*R-squared (0.7969), and Scaled Explained SS (0.9463) are all well above the 0.05 significance level, indicating that the null hypothesis of homoskedasticity cannot be rejected. Therefore, the residuals exhibit constant variance, satisfying the homoskedasticity assumption of the linear regression model.

Table 5. Residuals Correlogram

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.604	0.604	5.2163	0.022
		2	0.236	-0.202	6.1030	0.047
		3	0.050	0.001	6.1474	0.105
		4	-0.199	-0.308	6.9549	0.138
		5	-0.269	0.038	8.6851	0.122
		6	-0.242	-0.096	10.353	0.111
		7	-0.180	0.033	11.513	0.118
		8	-0.142	-0.148	12.470	0.131
		9	-0.213	-0.217	15.720	0.073
		10	-0.145	0.075	18.737	0.044

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The residuals correlogram indicates significant autocorrelation at lag 1 (AC = 0.604, p = 0.022) and lag 2 (AC = 0.236, p = 0.047), with the Q-statistics confirming statistical significance at these lags. This suggests the presence of serial correlation in the residuals, violating the assumption

of independence. While higher order lags exhibit diminishing autocorrelation, the significance at early lags, together with the low Durbin-Watson statistic (0.46), confirms that the residuals are not independently distributed. This issue may distort standard errors and inference results, highlighting the potential need for model re-specification or the inclusion of autoregressive terms.

Table 5. Confidence Interval Estimation

		90% CI		95% CI		99% CI	
Variable	Coefficient	Low	High	Low	High	Low	High
C	1.138869	-0.000434	2.278171	-0.267090	2.544828	-0.880945	3.158682
LNARRIVALS	0.999096	0.924525	1.073667	0.907071	1.091120	0.866892	1.131299

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The coefficient for LNARRIVALS is highly precise, with the 95% confidence interval ranging from 0.907 to 1.091, confirming a statistically significant and robust positive effect on overnight stays. The intercept shows wider intervals, indicating greater uncertainty. Overall, the confidence intervals support LNARRIVALS as a reliable predictor in the model.

Table 5. Model Diagnostic Tests (Residual Analysis)

obs	Actual	Fitted	Residual	Residual Plot
2013	16.4890	16.4387	0.05035	
2014	16.5147	16.4712	0.04346	
2015	16.4904	16.4510	0.03941	
2016	16.4328	16.4241	0.00869	
2017	16.5037	16.5210	-0.01730	
2018	16.5325	16.5495	-0.01694	
2019	16.5312	16.5736	-0.04245	
2020	15.7060	15.7326	-0.02658	
2021	16.0865	16.0766	0.00996	
2022	16.5090	16.5273	-0.01832	
2023	16.6157	16.6460	-0.03028	

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

The residual analysis indicates that the model's predicted values closely match the observed values. Residuals are small, symmetrically distributed around zero, and show no discernible pattern over time. This indicates no systematic bias, supporting the validity of the model specification.



Figure 4. Residual Graph

Source: Author's own processing (EViews 12 Student Version Lite, 2026)

Throughout the period, the model's fitted values closely match the observed data, indicating strong predictive accuracy. Deviations remain small, centered around zero, and show no systematic pattern, supporting the linear specification of the model. A larger deviation occurs in 2020, likely due to external shocks, but it stays within acceptable limits, confirming the model's overall reliability.

CONCLUSIONS & RECOMMENDATIONS

The analysis shows that Sicily's tourism performance remains strong within the national context, despite persistent structural disparities between northern and southern Italy. In 2023, the region recorded over 5.5 million arrivals and 16.4 million overnight stays, confirming its role as a major Mediterranean destination. The econometric result for 2013-2023 indicate a stable and statistically significant elasticity close to 1, demonstrating that increases in tourist arrivals translate almost proportionally into higher overnight stays. Diagnostic tests support the robustness of the

model, although the presence of positive autocorrelation suggests that the future research could benefit from dynamic or autoregressive specifications.

These findings suggest several policy priorities. Enhancing transport connectivity and internal mobility would improve Sicily's accessibility and tourism potential. Diversifying tourism offerings especially cultural, rural, and off-season experiences could mitigate seasonality and increase resilience. Enhancing data-driven planning and using more advanced modelling tools would improve demand monitoring, while targeted investments in infrastructure, skills, and service quality support efforts to reduce regional disparities while promoting long-term sustainable tourism.

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