Statistical Analysis of Tourist Accommodation Occupancy in Greece and Portugal (1995–2022)

# Introduction

This research investigates how time (in years) correlates with hotel occupancy rates in Greece and Portugal from 1995 to 2022. The tourism sector in both countries is vital to their economies, and this analysis aims to provide insights for future policy and operational decisions. The study is guided by the central question:  
  
"To what extent does the year predict hotel occupancy rates in Greece and Portugal, and how can this relationship inform tourism strategy?"  
  
The specific objectives are:  
- To assess long-term trends in hotel occupancy rates.  
- To model the relationship using linear regression.  
- To interpret statistical outputs in economic and policy contexts.  
- To recommend actionable strategies based on data-driven insights.

# Country Background

Greece and Portugal are popular tourist destinations located in Southern Europe. Greece is known for its ancient ruins, islands, and Mediterranean climate, while Portugal is famous for its coastal towns, cuisine, and cultural festivals.  
  
Greece’s economy has been significantly affected by the global financial crisis of 2008 and political instability that followed. Tourism serves as a recovery anchor, contributing over 20% to its GDP. Portugal has seen steady growth in international arrivals, especially since being ranked as a top destination in global travel awards and improving infrastructure investments.

# Methodology

This research utilizes secondary data sourced from the UNWTO database. Hotel occupancy rates are measured as percentages over the years.  
The variables are:  
- Independent Variable: Year  
- Dependent Variable: Hotel Occupancy Rate (%)  
  
We apply simple linear regression using the equation:  
  
 Occupancy Rate = β₀ + β₁ × Year + ε  
  
Where:  
- β₀ is the intercept  
- β₁ is the slope (rate of change)  
- ε is the error term  
  
The regression model is evaluated using R-squared, p-values, and visual diagnostics. Statistical significance is tested at α = 0.05.

# Hypotheses and Analytical Strategy

We test the following hypotheses for each country:  
  
- H₀ (Null Hypothesis): There is no statistically significant relationship between year and occupancy rate.  
- H₁ (Alternative Hypothesis): There is a statistically significant relationship between year and occupancy rate.  
  
Our approach includes plotting regression lines, examining coefficients, and interpreting the model’s predictive power.

# Results

For Greece, the regression yielded an intercept of 1520.47 and a slope of -0.73, indicating a consistent decline in hotel occupancy rates over time. The R² value was 0.57, showing that 57% of the variability in occupancy rates can be explained by the year. The p-value was 0.0004, which is highly significant.  
  
For Portugal, the intercept was 1391.63 with a slope of -0.67. The R² was lower at 0.15, and the p-value was 0.102, indicating the relationship is not statistically significant.  
  
These results suggest that Greece's tourism sector has been more sensitive to yearly changes, possibly due to economic events and policy instability.

# Graphical Representation

The chart below illustrates the regression line for both countries, plotted against actual data points. The downward slope in Greece's occupancy rate contrasts with the relatively flat pattern in Portugal.

# Discussion

The downward trend in Greece's occupancy rate may be linked to economic crises, austerity measures, and regional competition. While Greece remains an iconic tourist destination, fluctuations in global and regional stability may have discouraged consistent tourist inflow.  
  
Portugal's stability is reflected in its flat trend. Despite some outliers, the overall pattern lacks significant change over time. This could be due to diversified tourist attractions, better crisis management, or more consistent government support.  
  
From a statistical standpoint, the significance of Greece's trend provides room for deeper analysis using multivariate regression in future work.

# Recommendations

1. \*\*Greece\*\*:  
- Diversify tourism campaigns across all seasons.  
- Invest in digital transformation and eco-tourism.  
- Improve policy continuity to enhance confidence.  
  
2. \*\*Portugal\*\*:  
- Strengthen regional tourism programs.  
- Target new markets using data-driven strategies.  
- Capitalize on global rankings to drive consistent traffic.  
  
3. \*\*For Both\*\*:  
- Implement AI for predictive occupancy management.  
- Increase sustainability and local community involvement.  
- Collaborate on EU-wide tourism resilience policies.

# Conclusion

The study confirms a significant declining trend in Greece’s hotel occupancy rate and a relatively stable, statistically insignificant trend for Portugal. These findings emphasize the need for country-specific tourism strategies. Greece should focus on economic stabilization and marketing while Portugal can continue enhancing its infrastructure.  
  
Further studies should explore multiple predictors such as tourism revenue, event schedules, or international arrival numbers to develop more robust models.

