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TOURISM-DRIVEN EMPLOYMENT IN GREECE: UNPACKING REGIONAL SPILLOVERS AND THE ROLE OF MARKET DYNAMICS

Abstract

Inbound tourism performance is an important factor in the overall business cycle in Greece. In 2016-2022, the change in inbound tourism exports constituted about a half of the GDP change. This paper analyses the structural issues of employment effects of the inbound tourism in Greece in 2009-2022. Correlation analysis was used to find associations between tourism indicators and employment in accommodation services; agriculture; food and beverage industry; food and beverage service activities; libraries, archives, museums and other cultural activities; water collection, treatment, and supply. No significant effect on employment trends in air transport and tour reservation services was found. Tourism is especially important in some regions of Greece, where it also provides spillover effects to employment in local suppliers. Regression models were used to estimate the positive effects on employment in accommodation establishments, total regional employment and its sectoral structure, unpacking regional spillovers and the role of market dynamics.

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7 tables, 35 references.

Problem Statement

Tourism industry is an important contributor to the economy of Greece, as well as many other economies. As an export industry, it helps Greece to earn revenues from foreign tourists and stimulate demand for domestic supplies, which creates positive spillover effects for other industries. By supporting employment, tourism may help to promote economic growth, decrease income inequality, stimulate development of regions, and motivate individuals to pursue education and personal development. Employment benefits of tourist arrivals may vary by particular sectors, according to their labour intensity, productivity, labour market regulation, hiring practices, demand structure, business cycle, and other factors.

The **aim of this paper** is to estimate direct and indirect effects of inbound tourism indicators in Greece on employment in the related industries. Despite obvious reasoning for the effect, its actual magnitude in real conditions of the modern economy of Greece is to be estimated. This may further help to assess potential efficiency of using the resources of the government and local authorities in marketing activities to stimulate tourism demand and infrastructural investment, taking into account economic and social criteria. The case of Greece may also be interesting for other countries in the European and Mediterranean region or other tourism-dependent economies.

This paper starts with a review of previous studies on tourism and employment, first worldwide and then in Greece. The next section explains methodology: sources of data, used indicators and the procedures applied within correlation and

regression analysis. The Results section provides information about recent trends in tourism indicators in Greece, correlations between employment in industries and market dynamics in tourism, its link with the business cycles, calculated tourism and employment ratios in Greek regions, as well as several regression models for direct and indirect employment effects of tourism. Finally, the main research findings are summarized and compared with previous quantitative studies.

Literature Review

The tourism sector is an important component of the global economy as it employs more people worldwide than the motor-vehicles and chemicals industries (Santos, 2023). Therefore, it has become the focus of researchers' attention, especially in countries specializing on attracting tourists. Previous research on tourism employment is based on analysis of either many countries or individual territories. They also vary by the scope of particular services. There are two groups of tourism employment: with direct contact with tourists (hotels, travel agencies, tourism information offices, aircrafts and cruise ships, restaurants, resorts and shops) and indirect employment (such as their suppliers, construction companies, manufacturers of aircrafts and other vehicles, handicrafts producers, marketing agencies, accounting services) (Obadić & Pehar, 2016).

Marques Santos et al. (2020) used a Granger causality test to prove the effect of tourism on employment in the EU regions in 2000-2018 when both linear and log-linear models are applied. Bidirectional relationship is also discovered but only when log-linear model is applied. Increase in tourist arrivals by 1000 causes growth of employment by 20 persons, and arrivals growth by 10% leads to 0.9% increase in employment. As for a national level, for example Imam & Ananda (2022) proved that in Sri Lanka direct and indirect employment depended on tourist arrivals, tourism receipts and arrivals in the fourth quarter. A positive significant effect of tourism on economic growth and employment was also registered in the case of Pakistan in 1990-2015. Fifteen percent of variation in employment was caused by tourism growth (Manzoor et al., 2019). Diakonidze (2019) forecasted that the share of tourism in employment could increase from 6% to 9% in Georgia.

But there are also country studies concluding that tourism may not necessarily increase employment. In Turkey, tourism only slightly helped to decrease unemployment and poverty despite the fast growth of the sector (Tosun et al., 2023). In Cyprus, labour shortage in hotel sector may coexist with unemployment. In this case, attracting skillful labour becomes a challenge for hotels. That is why they practiced inviting foreign workers, mostly from Greece and Eastern Europe (Yakavenka et al., 2023). There was a negative but insignificant effect of foreign tourists on employment growth in Northern Portugal in 2006-2014 (Santos, 2023).

Inchausti-Sintes (2015) wrote that, besides a potential for revitalisation of the Spanish economy, tourism also can be a source of the so-called «Dutch disease» by causing resource allocation towards non-tradable sectors and real exchange rate appreciation, which may undermine productivity. Tourism arrivals in wine routs in Spain in 2008-2018 had a positive effect on economic growth but no definite effect on employment (Vázquez Vicente et al., 2021).

Some studies focus on local, demographic or proximity structure of employment. For example, the externalities of specialization, urbanization and diversification affect tourism employment in Brazil. However, there is a competition effect between municipalities: increasing tourism employment in one region reduces the same indicator in its neighbouring communities (Ribeiro et al., 2018). In a sample of 5 Mediterranean countries, the contribution of tourism to employment varied from 3.8% in France to 9% in Greece. The role of workers with higher education in the tourism sector was increasing in those countries (Obadić & Pehar, 2016). Sergo (2019) noted that there was a positive relationship between tourism per capita indicators and employment in NUTS-2 regions in 2006-2017. But the effect on employment of older workers (55-64 years) was not significant.

As for the factors of employment, some authors underscored the importance of seasonality. Mamula & Duvnjak (2017) showed that the models considering seasonality can better predict employment in the accommodation sector in Croatia, a country that has become the most tourism-dependent EU member state by 2015. Grobelna & Skrzeszewska (2019) used a sample of tourism and hospitality students in Northern Poland to find out that they mostly had positive views about seasonality of employment in tourism. Those who favoured seasonality were more inclined to work in the tourism sector in the future. Wijesundara & Ranasinghe (2015) mentioned «social considerations, recruitment process, skills development, progression pathways, cultural barriers and lack of infrastructure facilities» as the barriers to tourism employment of people in rural areas in Sri Lanka. Crises could also affect tourism, especially the most recent pandemic crisis. Marques Santos et al. (2020) considered three potential scenarios for employment in tourism in the EU in summer and autumn of 2020 under the COVID-19 pandemic: «Confidence to travel scenario: extended hot long summer; Fear to travel scenario: escape to wherever; and Third wave scenario: Islands of tourism».

Efficiency of tourism employment was also discussed. In general, tourism employment growth by 1% increased economic growth by 0.15-0.61%. The analysed sample for this conclusion included some OECD countries in 2008-2020 (Vuković et al., 2023). According to Dorta-González and González-Betancor (2021), in a sample of 19 OECD and 5 non-OECD countries in 2008-2018, the largest ratio of tourism receipts per arrival was achieved by relatively larger share of the labour force in travel agencies and other reservation services (the elasticity was 0.28) and sports and recreation industry (0.13) in comparison to food, beverage (-0.26) and cultural industries (-0.08).

As one of the major tourism countries, Greece was also at the focus of researchers. Tourism provides both direct and indirect contributions to the Greek economy: in 2018 €21.6 billion and €35.6 billion respectively (Papadopoulou, 2020). There is a link between employment rate in tourism industry, number of tourists, and the GDP growth in Greece (Medová et al., 2021).

Tourism is especially important for some groups of population and territories. In the pre-pandemic period new hires in tourism-related sectors mostly favoured youth (Betcherman et al., 2023). Tourism is the main source of income for the Greek islands (Dimelli, 2017; OECD, 2017). For example, agriculture and tourism constitute 50% of the GDP of Crete (Vourdoubas, 2020). Greece has more than 6 000 islands, islets and rocks including 53 with a population more than a thousand. But only a few of them receive the main part of tourism income. More diversified island tourism can help to develop smaller islands and support jobs there (OECD, 2017). Tourism may provide jobs in island and mountain regions of Greece to demotivate youth from leaving those regions helping to solve the problem of population ageing there (Kalantzi et al., 2023).

Type of tourism services also matters. In accommodation sector of Greece 5-star hotels supported stability of employment because they operated all-year round unlike 1-star hotels, which were smaller and were more affected by the crisis of 2008 (Papatheodorou & Arvanitis, 2014). Development of BnB activities is an alternative to hotels. More than 100 000 homes registered in Airbnb in Greece provided jobs for about 1 thousand people (Menegaki & Agiomirgianakis, 2019). As for sports tourism in the region of Messinia, golf supported more jobs than windsurfing, horse riding and scuba diving. But scuba diving had the largest employment multiplier. Small firm employ relatively more people as they are more labour-intensive. Also, primary sports tourists have larger employment multipliers than tourists interested in sports (Drakakis et al., 2021).

The crisis starting in 2008 was especially long in Greece and many people hoped that inbound tourism could help the economy to overcome it. Employment decreased in 8 regions in 2007-2010 (it was important whether a region was a mainland or island region), but when a longer period is considered (2007-2013) employment declined in all regions of Greece (Karoulia et al., 2016). Karoulia et al. (2015) also analysed resilience of tourism industry in Greek regions during the economic crisis starting in 2008. They were resilient by the criterion of number of establishments. Epirus, South Aegean and Ionian Islands even managed to quadruple their capacities. But Western Macedonia had a small decrease. About a half of the regions were resilient by the criterion of employment. North Aegean, Epirus and Eastern Macedonia increased employment in the tourism sector. But another half had a decreasing employment in that sector.

Besides pure quantitative labour indicators, employment conditions also matter. The global trend was that employees in tourism industry usually had lower wages and worse employment conditions than in other sectors. But before the

debt crisis of 2010 the conditions in Greece were similar to other sectors thanks to a sector collective agreement. But after labour market deregulation Greece approached the global trend (Papadopoulos & Lyddon, 2020). Nevertheless, despite the crisis of 2008 and labour market reform, the wages and conditions of labour in hospitality and catering services sector were better preserved in Greece than in the UK. It could be explained by the remaining power of trade unions and tradition of collective bargaining in hotels in Greece and the limited migrant workforce (Papadopoulos & Ioannou, 2023).

Another major challenge was the coronavirus crisis. In 2020 the initial lockdown under the first pandemic wave decreased employment in tourist-affected sector in Greece by 9%. The government had prohibited layoffs; therefore, the decrease was explained by the lower hiring rates during that period. On the other hand, the government supported companies in the sectors with the condition that they should preserve employment (Betcherman et al., 2023). The government decided to cover social security contributions by the tourism enterprises as an emergency measure to help the industry and employment.

After the pandemic crisis, in 2022 employment in Greek tourism industry increased by 5 thousand and reached 800 thousand. It was expected that tourism would fully restore employment in the sector after the pandemic and create 17 thousand new jobs in 2023 (like in the peak of 820 thousand employed in tourism and travel industry in 2019). Meanwhile, in Europe the employment was expected to restore only by the end of 2024. The number of tourism employees in Greece may increase to 1.02 million within a decade (World Travel and Tourism Council, 2023).

Therefore, most studies support the conclusion on positive effect of tourism on employment, but the structural effects may vary depending on territory, demographic group and type of services, which requires additional attention. There are several quantitative case studies for the analysed effect in other countries. Most studies devoted to Greece consider partial aspects of the problem (individual market or employment segments or regions), other related issues (employment conditions and government support), use simple trend analysis methodology or earlier data. This study focuses on Greece in assessing the impact of inbound employment on employment with sectoral and regional breakdown in order to estimate direct effect on tourism and indirect effects on other industries.

Methodology

The trends in GDP, tourism exports and employment in the tourism-related activities are compared in 2009-2024. Contribution of inbound tourism to changes of the GDP in Greece in 2008-2024 was calculated.

At the next stage correlation analysis of various indicators of tourism sector indicators and employment in Greece is used. Eurostat (2025) was the source for all the data. Economic growth is considered too because changes in employment also may be caused by the general macroeconomic situation. Growth rates are used for tourism indicators, employment and GDP.

Employment is analysed in the sectors, which are either directly or indirectly related to inbound tourism. Indirect relation means that tourism sector may consume services or products of the indirectly related sectors. For example, foreign tourists also may consume food, beverages, use electricity, attend sports events etc., although their input in demand there is smaller than in demand for directly related sectors (at least air transport, accommodation and activities of tour operators). NACE classification of sectoral activities (Nomenclature statistique des activités économiques dans la Communauté Européenne – Statistical classification of economic activities' in the European Community) is used.

Tourism indicators include the data on international tourism and turnover in tourism-related industries. Growth rates of arrivals of foreigners at tourist accommodation establishments and employment in 2009-2022 were used for correlation analysis (but the data for the arrivals was not available for 2 years: 2010 and 2012). The analysed periods are based on availability of data because there was a reclassification of sectors and other methodological changes by Eurostat in 2008. Inclusion of earlier periods could challenge employment and balance of payments data consistency.

Regression model based on national time series for Greece is created to estimate the effect of inbound tourism (growth of arrivals) on employment growth in accommodation sector. Since the sample of national data is small, robustness check was provided by excluding outliers, redefining the inbound tourism variable (dynamics of nights spent), controlling for another demand factor (domestic tourists' arrivals) and supply factors (number of bed-places or enterprises in accommodation enterprises).

Then regional approach with a larger sample of panel data was used to determine importance of tourism for local employment first in a wider set of tourism related sectors and then all sectors of the Greek economy. Thirteen NUTS2 regions of Greece were analysed. Two ratio indicators (relatively the absolute size of the regions measured in the number of employees) were also calculated as an alternative to growth rates approach to find out the relationship between regional intensiveness of inbound tourism and importance of tourism-related industries for regional employment.

Research Results

There were 2 business cycles in 2008-2024 in Greece with a long-lasting financial crisis starting in 2008 and the pandemic crisis of 2020 (Table 1). The last crisis was more difficult for tourism industry. Employment in the accommodation sector dropped during the pandemic, while employment in air transport and tour reservation services decreased right before the pandemic. The overall employment was more stable during the pandemic than during the previous crisis of 2008-2013. And 2022 became a year of the fastest economic and employment growth in the recent years.

Table 1

Growth of the GDP, tourism services exports and employment in Greece, %

Year	GDP	Travel services exports	Employment, all sectors	Employment, air transport	Employment, accommodation	Employment, travel agency, tour operator and other reservation service and related activities
2009	-4.3	-10.6	-1.2	-3.0	-10.6	-16.1
2010	-5.5	-7.6	-3.6	10.8	-7.3	-9.9
2011	-10.1	9.3	-7.6	19.4	0.3	-11.8
2012	-7.1	-0.6	-8.6	-1.2	4.1	-0.8
2013	-2.5	16.4	-4.9	-15.3	-8.1	10.9
2014	0.5	10.2	0.6	20.8	25.5	58.3
2015	-0.2	5.5	2.0	4.6	-1.6	-10.0
2016	-0.5	-6.5	1.8	-9.9	4.7	10.6
2017	1.1	10.8	2.0	-7.3	9.3	-4.3
2018	1.7	10.0	1.9	-36.8	9.0	-31.2
2019	1.9	13.0	2.0	-25.0	-0.2	9.5
2020	-9.0	-76.2	-1.2	69.4	-26.5	13.3
2021	8.4	143.2	1.1	37.7	22.4	-4.7
2022	5.9	68.3	5.4	-51.2	13.7	9.3
2023	2.3	16.5	1.2	41.5	3.0	-13.6
2024	2.3	4.9	1.7	13.8	12.2	-3.9

Source: Eurostat (n.d.).

As for the most recent trends, according to Hellenic Statistical Authority (2025a), in February 2025, arrivals in tourist accommodation establishments reached 793 thousand (increase by 2.5% relatively February 2024 in total and 3.8% specifically for arrivals of foreigners), and nights spend were 1,736 thousand (3.5% and 4.9%). But the peak of the tourism season is in summer (in August 2024 the arrivals reached almost 7 million or 10 times more than in February).

According to Hellenic Statistical Authority (2025b), in February 2025 the number of employed persons was 4312 thousand in comparison to 405 thousand unemployed and 3044 persons under 75 years that neither work nor look for a job (persons outside the labour force). Except for the temporary increase in 2020, there was a steady decrease in unemployment since 2013 when it reached 27.6%. In February 2025, the seasonally adjusted unemployment rate reached 8.6% (after 11.5% in February 2024). The unemployment was higher among women (11.3%) and youth (16.8%) compared to men (6.4%) and adult persons (8.1%). The number of unemployed persons decreased by 26.3% within a year.

Considering the length of the analysed period, correlation analysis shows that macro-level tourism indicators do not significantly affect general employment in Greece, but may influence employment in some sectors (Table 2). As for directly related sector – accommodation, there is a very significant ($p < 0.01$), highly positive correlation (> 0.72) between employment and almost all tourism indicators (except for growth of bed-places in the sector). Under such a small sample of years a stricter significance threshold ($p < 0.01$) than ordinary one (0.05) is preferable.

But there was no significant correlation for employment in air transport and tour reservation services. The exception was a negative correlation between imports of tourism services and employment in air transport. Employment in these two sectors may be more rigid than in accommodation sector. Using 1 year lag leads to negative correlation for most tourism indicators and employment in air services (but none of them is very significant) and no significant correlation in the other two directly related sectors (Table 3). As for the direct effects, the number of very significant correlations is 8 out of 54, or 15%, which is much larger than assumed 1% error probability under $p < 0.01$.

As for indirectly related services, there are very significant ($p < 0.01$) positive correlations between most tourism indicators and employment in agriculture, food and beverages industry. Therefore, these sectors may have short-term spillover effects from international tourism. There are also possible minor effects for some other industries because of either positive or negative significant correlations (between employment and only 1 or 2 tourism indicators), which may be accidentally high. One sector has multiple negative and very significant correlations with tourism indicators (land transport and pipelines), which may indicate also a substitution effect between industries. The number of very significant correlations here is 23 out of 180, or 13%, which is much larger than assumed 1% error probability under $p < 0.01$.

Table 2

Correlation between growth rates of macro-level tourism indicators, GDP, and employment, 2009-2022

Sector	GDP growth, %	Travel Services exports growth, %	Travel Services imports growth, %	Arrivals of foreigners at tourist accommodation establishments, % growth	Nights spent at tourist accommodation establishments by foreigners, % growth	Bed-places in tourist accommodation, % growth	Turnover growth in Air transport; accommodation; travel agency, tour operator and other reservation service and related activities, %	Turnover growth in Air transport, %	Turnover growth in Accommodation and food service activities, %	Turnover growth in Travel agency, tour operator and other reservation service and related activities, %
Total – all NACE activities	0.78	0.29	0.48	0.36	0.35	0.22	0.42	0.44	0.48	0.56
Crop and animal production, hunting and related service activities	0.63	0.66	0.58	0.77	0.77	0.70	0.71	0.63	0.72	0.76
Manufacture of food products	0.74	0.61	0.55	0.66	0.67	0.52	0.71	0.67	0.73	0.74
Manufacture of beverages	0.69	0.65	0.71	0.70	0.68	0.26	0.67	0.57	0.70	0.70
Manufacture of wearing apparel	0.23	0.03	-0.01	-0.02	-0.03	0.00	0.05	-0.03	0.07	-0.01
Electricity, gas, steam and air conditioning supply	0.10	0.06	-0.27	-0.12	-0.12	-0.69	0.09	-0.10	-0.03	0.00
Water collection, treatment and supply	0.45	0.12	0.56	0.20	0.21	0.24	0.19	0.43	0.27	0.41
Construction of buildings	0.68	0.37	0.45	0.37	0.38	0.08	0.46	0.50	0.44	0.57
Civil engineering	-0.21	-0.30	-0.33	-0.27	-0.29	0.11	-0.29	-0.41	-0.29	-0.36
Specialised construction activities	0.69	0.24	0.31	0.32	0.31	0.12	0.38	0.33	0.41	0.50
Wholesale trade, except of motor vehicles and motorcycles	-0.08	-0.35	-0.27	-0.32	-0.31	-0.27	-0.25	-0.19	-0.26	-0.16

Sector	GDP growth, %	Travel Services exports growth, %	Travel Services imports growth, %	Arrivals of foreigners at tourist accommodation establishments, % growth	Nights spent at tourist accommodation establishments by foreigners, % growth	Bed-places in tourist accommodation, % growth	Turnover growth in Air transport; accommodation; travel agency, tour operator and other reservation service and related activities, %	Turnover growth in Air transport, %	Turnover growth in Accommodation and food service activities, %	Turnover growth in Travel agency, tour operator and other reservation service and related activities, %
Retail trade, except of motor vehicles and motorcycles	0.33	-0.15	0.08	-0.07	-0.09	0.03	-0.07	-0.03	0.05	0.05
Land transport and transport via pipelines	-0.37	-0.65	-0.72	-0.67	-0.68	-0.41	-0.59	-0.78	-0.63	-0.60
Water transport	0.33	0.19	0.15	0.12	0.13	-0.06	0.24	0.18	0.19	0.20
Air transport	-0.42	-0.22	-0.63	-0.34	-0.34	-0.51	-0.24	-0.51	-0.35	-0.44
Warehousing and support activities for transportation	0.70	0.53	0.74	0.54	0.54	0.35	0.56	0.67	0.61	0.62
Accommodation	0.70	0.73	0.74	0.74	0.73	0.26	0.75	0.73	0.78	0.73
Food and beverage service activities	0.37	-0.06	0.41	0.07	0.06	0.33	0.03	0.30	0.18	0.21
Travel agency, tour operator and other reservation service and related activities	0.09	-0.06	0.03	-0.11	-0.11	-0.21	-0.01	0.02	0.00	0.00
Creative, arts and entertainment activities	-0.01	0.22	0.06	0.06	0.07	-0.38	0.16	0.06	0.10	0.03
Libraries, archives, museums and other cultural activities	0.24	-0.01	0.43	0.09	0.10	0.14	0.07	0.40	0.14	0.27
Gambling and betting activities	0.42	0.22	0.15	0.19	0.19	0.02	0.24	0.24	0.23	0.32
Sports activities and amusement and recreation activities	0.19	-0.19	0.18	-0.05	-0.06	0.13	-0.08	0.10	0.03	0.11

Source: authors' calculations using data from Eurostat (n.d.). Note: significant correlations: larger than 0.54 ($p<0.05$) or 0.67 ($p<0.01$).

Analysis of the data with 1 year lag shows that there is very significant positive effect ($p < 0.01$) of most tourism indicators on employment in water collection, treatment and supply; food and beverage service activities; libraries, archives, museums and other cultural activities; and of 1 indicator on employment in sports activities and amusement and recreation activities. This lagged effect is even more theoretically rationalized because there is no significant lagged correlation with economic growth in these sectors. The number of very significant correlations here is 21 out of 180, or 12%, which is also much larger than assumed 1% error probability under $p < 0.01$. Thus, in all these cases a great majority of very significant correlations, especially where multiple tourism indicators have high correlations for the same industry, cannot be explained by coincidence.

Meanwhile, there are also several indirectly tourism-related sectors were correlation analysis shows either absent or non-robust relationship between tourism indicators and employment: electricity, gas, steam and air conditioning supply; creative, arts and entertainment activities; manufacture of wearing apparel, construction, trade, water transport, gambling and betting activities. There are still possible spillover effects from tourism, but they are too small to be statistically visible when annual time series are analysed.

The main problem in correlation analysis (when no time lag was used) was that in all sectors where employment correlated with tourism indicators it also correlated with the GDP at a similar level. Therefore, it is hard to separate the effect of inbound tourism from the effect of domestic business cycles. On the other hand, if domestic cycles depended completely on international tourism it would not be a problem. That is why it is necessary to assess how much Greek economy depends on trends in international tourism.

Except for growth of bed-places in tourist accommodation, GDP growth is strongly correlated with tourism indicators (0.76-0.9), which are also strongly correlated to each other (0.82-0.96). Travel services imports in Greece were mostly stable (usually around 2 billion euro) and did not contribute much to the change in the GDP (Table 4). The contribution of increase of tourism services exports to increase of GDP varied from -85% to 77%, but in 2016-2022 trends in inbound tourism were on average equal to about half of the GDP increase. In 2023 and 2024 there was a lower contribution. Therefore, recently GDP of Greece was usually strongly dependant on foreign tourists as much as on all the rest of the domestic economy.

Regional panel data analysis based on a larger sample shows that there is a general positive link between inbound tourism and overall employment (Table 5). This may tell that spillover effects to other industries from inbound tourism may be more evident at the local regional level. The effect on agricultural employment is without a time lag, but the effect on the aggregate employment in trade, transport, accommodation, food services, entertainment, recreation, and several other industries is with 1 year lag. The results on agriculture, food services, entertainment and recreation are in line with the lags determined with the national data without regional disaggregation. But different classification of industries in regional data may affect the results.

Table 3

Correlation between growth rates of macro-level tourism indicators, GDP and employment, 2009-2022, 1 year lag

Sector	GDP growth, %	Travel Services exports growth, %	Travel Services imports growth, %	Arrivals of foreigners at tourist accommodation establishments, % growth	Nights spent at tourist accommodation establishments by foreigners, % growth	Bed-places in tourist accommodation, % growth	Turnover growth in Air transport; accommodation; travel agency, tour operator and other reservation service and related activities, %	Turnover growth in Air transport, %	Turnover growth in Accommodation and food service activities, %	Turnover growth in Travel agency, tour operator and other reservation service and related activities, %
Total – all NACE activities	0.78	0.36	0.23	0.32	0.31	-0.17	0.48	0.32	0.46	0.57
Crop and animal production, hunting and related service activities	0.63	0.02	-0.45	-0.05	-0.03	-0.14	0.06	-0.10	-0.06	0.00
Manufacture of food products	0.74	0.13	-0.22	0.04	0.06	-0.26	0.20	0.02	0.09	0.17
Manufacture of beverages	0.69	-0.05	-0.40	-0.07	-0.07	-0.34	0.03	-0.16	-0.04	0.05
Manufacture of wearing apparel	0.23	-0.17	0.03	-0.16	-0.19	-0.33	-0.12	-0.12	-0.03	-0.02
Electricity, gas, steam and air conditioning supply	0.10	-0.43	-0.33	-0.42	-0.42	-0.47	-0.38	-0.34	-0.42	-0.45
Water collection, treatment and supply	0.45	0.74	0.51	0.71	0.71	0.10	0.72	0.65	0.69	0.76
Construction of buildings	0.68	0.40	0.24	0.32	0.31	-0.32	0.45	0.26	0.40	0.49
Civil engineering	-0.21	-0.50	-0.23	-0.40	-0.40	0.02	-0.42	-0.23	-0.32	-0.39
Specialised construction activities	0.69	0.28	0.15	0.20	0.19	-0.21	0.38	0.22	0.35	0.46
Wholesale trade, except of motor vehicles and motorcycles	-0.08	0.35	0.44	0.29	0.29	0.15	0.38	0.37	0.38	0.42

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Sector	GDP growth, %	Travel Services exports growth, %	Travel Services imports growth, %	Arrivals of foreigners at tourist accommodation establishments, % growth	Nights spent at tourist accommodation establishments by foreigners, % growth	Bed-places in tourist accommodation, % growth	Turnover growth in Air transport; accommodation; travel agency, tour operator and other reservation service and related activities, %	Turnover growth in Air transport, %	Turnover growth in Accommodation and food service activities, %	Turnover growth in Travel agency, tour operator and other reservation service and related activities, %
Retail trade, except of motor vehicles and motorcycles	0.33	0.24	0.38	0.27	0.25	0.07	0.36	0.34	0.42	0.50
Land transport and transport via pipelines	-0.37	-0.32	0.06	-0.36	-0.37	-0.07	-0.30	-0.10	-0.21	-0.18
Water transport	0.33	-0.05	-0.07	-0.08	-0.10	-0.31	-0.06	-0.09	-0.03	-0.04
Air transport	-0.42	-0.56	-0.31	-0.60	-0.60	-0.15	-0.60	-0.57	-0.57	-0.55
Warehousing and support activities for transportation	0.70	0.24	0.05	0.32	0.31	-0.04	0.34	0.14	0.31	0.39
Accommodation	0.70	0.01	-0.35	0.00	0.00	-0.38	0.07	-0.12	-0.01	0.01
Food and beverage service activities	0.37	0.70	0.64	0.72	0.71	0.22	0.76	0.71	0.80	0.84
Travel agency, tour operator and other reservation service and related activities	0.09	0.20	0.19	0.14	0.14	-0.09	0.13	0.13	0.11	0.19
Creative, arts and entertainment activities	-0.01	-0.45	-0.50	-0.37	-0.37	-0.31	-0.42	-0.39	-0.44	-0.49
Libraries, archives, museums and other cultural activities	0.24	0.88	0.65	0.84	0.84	0.19	0.86	0.81	0.83	0.81
Gambling and betting activities	0.42	0.19	0.20	0.12	0.11	-0.40	0.26	0.15	0.21	0.27
Sports activities and amusement and recreation activities	0.19	0.63	0.52	0.56	0.57	0.18	0.66	0.65	0.65	0.72

Source: authors' calculations using data from Eurostat (n.d.). Note: significant correlations larger than 0.55 ($p < 0.05$) or 0.69 ($p < 0.01$).

Table 4

Contribution of inbound tourism to changes of the GDP in Greece

Year	Travel service, credit, million euro	Travel service, debit, billion euro	GDP, billion euro	Travel services, credit, increase, million euro	GDP increase, increase, million euro	Ratio: travel services exports increase/GDP increase
2008	11.6	2.7	242			
2009	10.4	2.4	238	-1236	-4456	0.28
2010	9.6	2.2	224	-789	-13410	0.06
2011	10.5	2.3	203	894	-20816	-0.04
2012	10.4	1.8	188	-61	-14928	0.00
2013	12.2	1.8	180	1708	-8496	-0.20
2014	13.4	2.1	177	1241	-2648	-0.47
2015	14.1	2.0	176	733	-867	-0.85
2016	13.2	2.0	174	-919	-1875	0.49
2017	14.6	1.9	177	1423	2409	0.59
2018	16.1	2.2	180	1456	2654	0.55
2019	18.2	2.7	183	2093	3794	0.55
2020	4.3	0.8	165	-13861	-17945	0.77
2021	10.5	1.1	182	6184	16269	0.38
2022	17.7	1.9	208	7174	26356	0.27
2023	20.6	2.4	225	2917	17343	0.17
2024	21.6	2.8	238	1000	12377	0.08

Source: authors' calculations based on data from Eurostat (n.d.).

Table 5

Correlation between growth of arrivals of foreigners at tourist accommodation establishments by NUTS 2 regions and employment growth in 2009-2022

	No lag	1 year lag
Employment, total	0.31	0.36
Employment, Wholesale and retail trade, transport, accommodation and food service activities	0.15	0.24
Employment, Arts, entertainment and recreation; other service activities; activities of household and extra-territorial organizations and bodies	-0.02	0.38
Employment, Agriculture, forestry and fishing	0.24	0.14

Source: authors' calculations using data from Eurostat (2025). Note: significant correlations *($p < 0.05$)* are larger than 0.16 without lag and 0.19 with 1 year lag.

The calculated regional ratio indicators (relative size of the regional labour market) are shown in Table 6 and Table 7. Notio Aigaio, Ionia Nisia, and Kriti are the regions that are most dependent on inbound tourism. The correlation between the two ratios is 0.87. In 2023 and 2024 there were only minor changes in the ratios and the cross-sectional correlation was 0.97 in 2023.

Table 6

Arrivals of foreigners at tourist accommodation establishments / total employment (AF/TE), times

Country, Region	2008	2009	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Greece	2.0	2.3	3.0	3.7	4.4	4.7	4.7	5.2	6.5	6.5	1.5	3.2	5.7	6.4
Attiki	1.2	1.2	1.4	1.5	1.9	2.1	2.0	2.2	2.6	2.5	0.5	1.1	2.1	2.6
Voreio Aigaio		2.8	3.3	4.0	5.0	5.7	4.2	4.8	5.2	5.1	0.6	1.8	4.4	5
Notio Aigaio	12.9	16.8	23.4	24.9	27.7	28.0	30.2	34.4	47.6	50.5	14.1	31.5	49.2	55.6
Kriti	7.2	8.1	10.9	14.6	17.3	18.2	19.4	19.7	23.5	22.6	6.0	13.5	22.1	23.2
Anatoliki Makedonia, Thraki	0.6	0.8	0.9	1.6	1.9	2.1	2.1	2.3	2.5	2.6	0.5	1.1	2.3	2.8
Kentriki Makedonia	1.3	1.8	2.2	3.1	3.6	3.8	3.5	3.7	4.4	4.5	0.8	2.1	4.0	4.1
Dytiki Makedonia		0.2	0.3	0.3	0.3	0.2	0.2	0.3	0.3	0.3	0.1	0.1	0.2	0.3
Ipeiros	0.6	0.8	1.2	1.4	1.9	2.0	2.2	2.9	3.8	4.3	0.6	1.6	3.7	3.4
Thessalia	0.9	1.0	1.2	1.3	1.8	2.0	1.8	2.1	2.7	2.9	0.5	0.9	2.2	2.7
Ionia Nisia	9.0	12.1	14.9	17.0	22.3	24.2	25.1	29.8	34.7	35.5	9.1	21.3	34.5	41.0
Dytiki Ellada	1.3	1.2	1.3	1.2	1.1	1.4	1.1	1.3	1.6	1.7	0.3	0.6	1.3	1.7
Sterea Ellada	1.0	1.0	1.0	0.8	1.1	1.2	1.2	1.5	2.2	2.3	0.4	0.8	1.7	2.0
Peloponnisos	1.3	1.7	2.1	1.8	2.4	2.6	2.8	3.3	4.4	4.4	0.8	1.8	3.5	4.1

Source: authors' calculations using data from Eurostat (n.d.).

Table 7

Employment in trade, transport, accommodation and food service activities / total employment (SE/TE), %

Country, Region	2008	2009	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Greece	30.0	30.0	30.8	30.3	31.0	32.1	32.4	32.6	32.4	33.0	33.0	31.5	31.6	31.2	32.0
Attiki	31.5	31.3	32.6	32.4	32.7	33.5	33.2	32.6	32.2	33.2	33.8	31.3	31.3	31.2	31.9
Voreio Aigaio	30.5	31.1	31.0	34.2	29.8	28.6	33.4	33.1	33.3	34.6	32.6	29.4	34.8	31.3	27.9
Notio Aigaio	45.3	43.8	39.6	40.7	46.1	49.6	47.5	50.2	52.6	54.9	48.3	47.5	46.8	49.3	50.4
Kriti	34.9	33.4	34.5	34.2	37.1	40.2	40.5	36.9	37.5	38.4	36.1	33.8	35.2	36.3	38.0
Anatoliki Makedonia, Thraki	23.1	24.1	24.6	20.8	22.4	26.1	26.7	27.3	26.5	28.3	29.0	26.4	25.9	26.7	29.7
Kentriki Makedonia	29.5	30.5	31.4	31.1	31.0	30.8	31.2	31.8	31.7	31.9	33.2	32.8	32.2	30.9	31.6
Dytiki Makedonia	22.8	23.2	25.9	23.4	24.6	24.3	23.3	24.9	22.4	22.7	24.9	26.6	25.5	28.4	21.8
Ipeiros	25.5	26.4	28.2	28.0	27.5	28.9	25.6	28.7	32.7	31.3	31.1	32.4	28.7	29.2	25.7
Thessalia	25.4	25.1	27.3	23.7	24.5	27.7	28.8	29.6	29.2	28.8	29.7	27.7	27.8	26.7	27.5
Ionia Nisia	43.7	42.7	36.3	36.4	38.7	43.9	49.6	53.5	53.2	47.8	45.1	52.0	48.7	49.7	51.6
Dytiki Ellada	28.1	28.3	28.2	29.2	29.4	29.7	29.1	29.7	30.2	28.9	27.7	30.8	30.4	27.5	31.0
Sterea Ellada	26.4	24.9	26.2	28.3	29.6	26.9	29.4	30.8	29.2	29.9	29.1	25.7	27.7	29.1	31.8
Peloponni-sos	24.3	25.8	25.1	23.2	25.1	26.7	28.3	30.2	28.4	30.3	31.5	29.4	30.5	27.7	27.3

Source: authors' calculations using data from Eurostat (n.d.).

The first regression model (Model 1) estimates the effect of arrivals of foreigners at tourist accommodation establishments, % growth (AF) on growth of employment in accommodation sector, % (EA), recalculated for the period 2009-2024 using the national data for Greece ($N = 16$, $R^2 = 0.51$):

$$EA = -0.44 + 0.22AF \quad (1)$$
$$(-0.17) \quad (3.8)^{***}$$

Note: In formulas, t-statistics are in parentheses, where *, **, and *** denote significance at $p < 0.1$, $p < 0.05$, *and* $p < 0.01$, respectively.

Therefore, on average each 5% (or 3-11% with 95% confidence) of arrivals growth increases employment in hotels and similar facilities by 1%. Testing for the effect of supply factors (growth of the number of bed-places and accommodation

establishments) by adding these factors in the model have not provided significant results for them. The correlation of the dependent variable with bed-places was only 0.25, and with establishments was even -0.15. This may be a result of a small sample, sufficiency of accommodation capacities or other reasons.

As for domestic tourists' arrivals as another demand factor, adding them into the model led to insignificance of its regression coefficient due to multicollinearity, despite high correlation with domestic arrivals (0.70 in 2011-2024). But the contribution of foreign demand is larger, considering absolute number of arrivals, for example, 27.4 million in comparison to 9.8 million of domestic arrivals in 2024.

There was an outlier residual (2.4σ) in 2014 in Model (1). Since the sample is small, excluding outliers is crucial for robustness check. But the regression without the outlier provides a similar b-coefficient for the factor ($N = 15$, $R^2 = 0.63$):

$$EA = -1.8 + 0.21AF \quad (2)$$
$$(-0.89) \quad (4.7)^{***}$$

If we redefine the tourism factor variable as Nights spent at tourist accommodation establishments by foreigners, % growth (NF), the next Model (2) provides similar results ($N = 16$, $R^2 = 0.49$):

$$EA = -0.16 + 0.21NF \quad (3)$$
$$(-0.06) \quad (3.7)^{***}$$

This provides evidence in favour of the influence of foreign demand as the dominant demand factor on employment in accommodation sector in Greece, although there should be a reservation that the analysed sample of annual data is small. Additional check with monthly data is complicated because Eurostat started providing it for tourism arrivals only in 2024, while the data for employment in accommodation sector is quarterly.

Another way is to check robustness of Model (1) is to use NUTS 2 regional panel data. This will provide a larger sample. Unfortunately, at that level the data specifically for employment in accommodation sector is unavailable. The closest available indicator used as a dependent variable is Growth of total employment in wholesale and retail trade, transport, accommodation and food service activities, % (EW). The model is created for 14 entities (Greece and its 13 regions) for the period 2014-2022. Hausman test ($p = 0.33$) shows that random effect model is a better choice than fixed effect approach. The resulting model (Model 4) is ($N = 126$, $R^2 = 0.26$):

$$EW = 1.86 + 0.043AF_t \quad (4)$$
$$(4.4)^{***} \quad (6.5)^{***}$$

Model (4) shows significant, but a smaller effect as a wider set of sectors is included, which are less dependent on inbound tourism. Despite the number of bed-places in hotels and similar enterprises has a positive correlation (0.4) with

the dependent variable, including it as a supply factor in the model leads to insignificance of its regression coefficient.

The next regression model (Model 5) estimates the effect of arrivals of foreigners at tourist accommodation establishments on growth of total employment in a region of Greece, % (TE) for the period 2014-2022 to consider wider economic effect. Unlike absence of lagged direct effect of arrivals of foreigners at the national level for employment in accommodation sector (correlation with lag 1 year is 0), indirect lagged effect exists in the panel data for total employment (correlation is 0.51). Therefore, lagged factor (AF_{t-1}) was included too. Hausman test (p=0.51) shows that random effect model is a better option ($N = 126$, $R^2 = 0.26$):

$$TE = 0.537 + 0.0211AF_t + 0.0245AF_{t-1} \quad (5)$$
$$(1.8)^* \quad (4.6)^{***} \quad (4.6)^{***}$$

If the supply factor is added – growth of the number of bed-places in hotels; holiday and other short-stay accommodation; camping grounds, recreational vehicle parks and trailer parks, % (BP), the random effect (Hausman test $p = 0.53$) model is transformed to Model (6) as ($N = 126$, $R^2 = 0.28$):

$$TE = 0.818 + 0.0111AF_t + 0.0169AF_{t-1} + 0.0604BP \quad (6)$$
$$(2.4)^{**} \quad (1.5) \quad (2.5)^{**} \quad (1.7)^*$$

The lagged effect on total employment of foreign demand for tourism services remains significant, while immediate effect of the foreign demand becomes insignificant and the supply factor (bed-places growth) becomes marginally significant. Thus, the direct effect for employment in accommodation and related sectors exists in the short run. Indirect effect on other sectors than tourism exists in the middle run when corrected for supply factor. The effect for total employment is several times smaller than for employment in travel sector because of its indirect nature.

Besides growth rates approach, it is possible to redefine dependent and independent variables as ratios to certain variable of size of a region (total number of employed persons). The next regression model (Model 7) estimates the effect of the ratio of arrivals of foreigners at tourist accommodation establishments to total employment, times (AF/TE), on the share of employment in trade, transport, accommodation and food service activities to the total employment, % (SE/TE) for the period 2008-2022 using the NUTS 2 regional panel data from the Table 6 and Table 7. A fixed effects model (Hausman test $p = 0.00$) is used ($N=180$, $R^2=0.23$):

$$SE/TE = 30.2 + 0.26AF/TE \quad (7)$$
$$(98.5)^{***} \quad (7.0)^{***}$$

The approach in Model (7) helps to check robustness of Model (4). It also proves significance of the effect even after correction for size of the regions. At the same time, it should be noted that the regression coefficients in Models (4) and (7) are incomparable due to the different units.

Discussion

This study on Greece supports the findings of Marques Santos et al. (2020) for the EU (based on earlier period). It also proved positive effect of tourism on total employment, although here the quantitative effect is much lower. In this study, we prove both direct and indirect effects in Greece like in the study by Imam & Ananda (2022) for Sri Lanka. Coefficient of determination shows that in Greece a larger share of variation in employment is caused by tourism growth than in Pakistan (Manzoor et al., 2019), which is easily explained by larger importance of tourism sector in Greece. As for previous studies for Greece only, this paper also shows the link between employment rate in tourism industry and numbers of tourists like in Medová et al. (2021), but uses longer period of data, correlation and regression analysis instead of graphic analysis. This study also considers the entire national economy unlike some studies for individual regions (Vourdoubas, 2020) or niche subsectors (Drakakis et al., 2021). Nevertheless, the findings in this study are limited by lack of detailed statistical data on regional level to consider additional factors or short time series at the national level, which affects precision of the estimated effects.

Conclusions

The Greek economy overcame the challenges of the financial crisis of 2008-2013 and the pandemic crisis of 2020 and switched to fast economic development in 2021-2022. After 2013, there were almost no cuts in the total amount of jobs, but there were large sectoral fluctuations. In 2022, Greece experienced the fastest growth in employment in recent years, although in 2023 and 2024 the growth has decelerated. Except for 2009, 2010 and 2020, tourism exports performed better than the overall economy of Greece. In 2016-2022, changes in inbound tourism exports were on average equal to about a half of the GDP increase, but there was a decrease in the ratio afterwards. Notio Aigaio, Ionia Nisia and Kriti are the regions that are most dependent on inbound tourism. Therefore, it was reasonable to assume that inbound tourism could influence employment in both the tourism sector and many other industries of Greece.

There is a positive effect of inbound and general tourism indicators on employment in accommodation services. Each 3-11% of foreigner's arrivals (or nights spent) growth increases the employment in hotels and similar facilities on average by 1%. This may be used in quantitative assessment of marketing campaigns aimed at attracting certain number of tourists considering cost to benefit ratio. Correlation analysis also suggested existence of a possible indirect demand

effect for employment in agriculture, food and beverages industry; food and beverage service activities; libraries, archives, museums and other cultural activities; water collection, treatment and supply either with 1 year lag or no time lag. Contrary to theoretical assumptions, employment trends in air transport and tour reservation services were unrelated to fluctuations in tourism indicators in the short run. The positive spillover effect of inbound tourism to the total employment in all sectors is more visible at the regional level. The effect on total regional employment lasts at least for 2 years after controlling for the supply factor (bed-places growth). The regions directly dependent on accommodation sector and tourism affected industries may have more incentives to contribute to marketing campaigns and facility development.

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