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TOURISM–EMPLOYMENT DYNAMICS UNDER THE KEYNESIAN AND SOLOW HYPOTHESES: THE CASE OF THE BLACK SEA REGION

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Abstract : The primary aim of this study is to identify the underlying reasons for the differences in tourism demand and supply among countries that share the same Black Sea coastline, by examining the short-run demand-driven and long-run supply-driven dynamics of tourism on employment in the Black Sea region. To this end, the study employs the Keynesian multiplier framework to highlight that increases in international tourism revenues stimulate aggregate demand and directly enhance employment in the short run, and utilizes the Solow growth hypothesis to demonstrate that capital investments in the tourism sector expand productive capacity and sustain employment in the long run. The empirical analysis covers six Black Sea countries over the period 1995–2024 and utilizes the dynamic Augmented Mean Group estimator to capture heterogeneous short- and long-run effects across countries. Empirical results indicate that, in the short run, the Keynesian hypothesis is supported at both the panel level and in Turkey and Ukraine, whereas in the long run, the Solow growth hypothesis is confirmed at the panel level and in Bulgaria and Ukraine, reinforced by tourism-related investments and also international tourism revenues, while the effects in other countries exhibit heterogeneity. The error correction coefficient is significant at both the panel and country levels, with employment observed to return to equilibrium approximately 1.5 years after short-term shocks.

Keywords: Keynes, solow, demand, supply, Black Sea, tourism, employment, AMG

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INTRODUCTION

The tourism sector is one of the most dynamic and labor-intensive areas of the service industry and plays an important role in promoting economic growth and job creation, particularly in developing countries. Its labor-intensive structure in various areas, including accommodation, catering, transportation, entertainment, and cultural services, increases tourism's ability to create both direct and indirect jobs (Zhao et al., 2023). Globally, tourism supports approximately 357 million jobs and accounts for about 10% of total employment; in developing countries, this proportion is even higher, with more than half of the employed population working in activities directly or indirectly related to tourism (WTTC, 2023). The tourism sector holds significant potential for Black Sea countries in terms of economic development and job creation. For example, in 2015, Georgia's tourism sector employed approximately 158,500 people and contributed 6.7% to the country's GDP (Giguashvili, 2017). Romania also experienced substantial tourism activity, attracting 115 million international tourists and generating $57 billion in revenue (Popescu et al., 2020). More recently, as of 2024, Turkey's tourism sector employed over 1.5 million people, accounting for approximately 9% of total employment (Karadeniz Ekonomi, 2024).These figures collectively highlight the crucial role of tourism in stimulating employment and supporting economic growth in the Black Sea region.

The effects of tourism beyond direct employment are also noteworthy. The sector creates indirect employment in sectors that supply goods and services to tourism businesses, such as agriculture, construction, and manufacturing; induced employment is also created as tourism workers spend their income in other areas of the economy (World Tourism Forum

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Institute, 2025). Furthermore, tourism's labor-intensive nature makes it less susceptible to automation, offering sustainable employment opportunities, particularly for unskilled and semi-skilled labor (Elgin & Elveren, 2024) The tourism sector, due to its structural reliance on human labor, plays a significant role in generating employment and promoting economic development, particularly in developing economies. Its economic effects are not only realized through income and investment but also through labor demand, positioning tourism as a key factor supporting socio-economic development.

The study simultaneously addresses two fundamental theoretical approaches: The Keynesian demand-side multiplier theory in the short term and the Solow supply-side growth model in the long term. The Keynesian approach is directly related to the labor-intensive nature of tourism. According to this theory, an increase in international tourism receipts raises total demand, thereby increasing labor demand and, as a result, expanding direct employment in the tourism sector in the short term (Figini & Vici, 2009). The increase in demand is rapidly converted into employment, particularly in labor-intensive sub-sectors (e.g., accommodation, restaurants, and transport services), where tourism activities are strongly tied to service provision and human input (Lucas, 2022). Therefore, in the short term, the growth effect of tourism is largely realized through the employment channel, i.e., through increased labor demand. In contrast, the Solow growth model provides a supply-side framework and explains the long-term effects of tourism through capital accumulation. Capital investments in tourism increase production capacity, making labor demand sustainable and thus contributing to the structural strengthening of employment in the sector. In this context, investments aimed at expanding tourism infrastructure and facilities support long-term sectoral development by enhancing productivity and strengthening the role of tourism in regional socio-economic transformation (Kyrylov et al., 2022). As a labor-intensive sector, tourism is directly affected by capital investments; new hotels, infrastructure, and facility investments both increase productivity and create long-term, permanent labor demand.

Therefore, the labor-intensive nature of tourism reinforces not only the short-term effects of demand growth on employment but also the long-term, supply-side effects of capital accumulation on employment (Magnani, 2015).

The Black Sea Region has the potential to benefit significantly from tourism due to its strategic location and natural and cultural diversity. However, despite ongoing tourism activities in the region since the mid-1990s, the short- and long-term effects of tourism on employment, particularly through demand and supply mechanisms, have not been sufficiently analyzed. To address this gap, the present study examines these dynamics across six Black Sea countries—Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine—over the period 1995–2024.

This study contributes to literature in three unique ways. First, considering the labor-intensive nature of the tourism sector, it develops a comprehensive analytical framework that theoretically integrates the demand and supply mechanisms in the sector. Thus, it stands out as one of the few studies that systematically examines the short-term demand-side and long-term supply-side effects of tourism on employment, particularly in the Black Sea region. Second, by combining the Keynesian multiplier approach with the Solow growth model within a single empirical structure, it enables the simultaneous testing of short-term demand-side effects and long-term supply-side effects, empirically revealing the two-way nature of the tourism-employment relationship from a dynamic perspective. Third, by using a heterogeneous panel estimation method, it considers structural differences between countries and presents original, applicable, and policy-oriented findings that will contribute to the design of tourism-based sustainable employment policies for Black Sea countries.

LİTERATURE REVİEW

This study examines the relationship between tourism and economic growth, considering demand-driven Keynesian multiplier theory in the short run (Figini & Vici, 2009) and supply-driven Solow growth hypothesis in the long run (Magnani, 2015). In the short run, international tourism revenues (ITR), as a demand factor, have a significant impact on direct employment in tourism (DET), whereas capital investment in tourism (CIT), as a supply factor, has limited or statistically insignificant effects. In the long run, CIT directly and positively influences DET through the expansion of production capacity and capital accumulation, while ITR encourages investment tendencies, producing indirect, limited, or statistically insignificant effects on DET. The empirical validity of both theoretical approaches under the short-run demand-driven Keynesian multiplier and the long-run supply-driven Solow growth framework is tested using the dynamic Augmented Mean Group (AMG) estimator. Within the literature review, the relevant studies are systematically compared in Table 1 based on their methodological approaches and variable selections, considering the short-run demand-driven Keynesian multiplier and long-run supply-driven Solow growth perspectives.

Tablo 1. Literature Review of Studies on Tourism Variables

Author(s)	Country, Period & Method	Findings
(Fayissa et al., 2008b)	Neoclassical approach; Panel Data Analysis; 42 African countries; (1995–2004)	- Supports the Cobb–Douglas–neoclassical growth hypothesis. - 10% rise in tourist spending → 0.4% rise in GDP per capita. - 10% increase in lagged tourism receipts → 0.25% rise in GDP per capita. - Foreign direct investment (FDI) has a positive but statistically insignificant effect.
(Fayissa et al., 2011b)	Neoclassical approach; Panel Regression Analysis;18 Latin American countries; (1990–2005);	- Tourism revenues positively influence both the current level and the growth rate of per capita GDP. - The effect of tourism on economic growth is more pronounced in low-income countries.
(Kum et al., 2015)	Keynesian approach; DOLS, FMOLS, Granger causality; Next-11 countries; (1995–2013);	- Long-run relationship between tourist arrivals and GDP - Tourism arrivals positively affect GDP growth - 1% ↑ in tourist arrivals→GDP↑by 0.06% (FMOLS), 0.08% (DOLS) - Unidirectional causality from EG to tourism arrivals - Confirms economic-driven tourism growth hypothesis (EDTH)

(Nguyen et al., 2024)	Kuznets curve hypothesis; Granger causality test by Dumitrescu and Hurlin, Panel Corrected Standard Errors (PCSE); 148 economies; (2002-2017);	-Tourism investments (supply) and spending in tourism (demand) increase employment in the tourism sector. -As income rises, the contribution of tourism investments and expenditures to employment initially increases and then decreases (Kuznets curve).
(Anis et al., 2023)	FMOLS, DOLS, Granger causality; Pakistan; (1995–2021);	- Long-run: tourism receipts, trade openness, and investment significantly affect economic growth - Short-run: bidirectional causality among the variables
(Baghirov & Sarkhanov, 2023)	Pedroni Panel cointegration (DOLS&DOLSMG); Selected high-income African countries; (1995–2019);	- International tourist arrivals positively affect tourism revenues. - CPI negatively affects tourism revenues. - In the long run, increase in international tourists → increase in tourism revenues; increase in CPI → decrease in tourism revenues.
(Sarkhanova & Baghirov, 2023)	Pedroni Panale cointegration (DOLS &DOLSMG); Georgia, Ukraine, Azerbaijan, Moldova (GUAM); (1995–2019);	- Long-run effect of tourism revenues on GDP per capita is positive. - CPI has mixed long-run effects across countries. - In the long run, an increase in international tourist arrivals → increase in tourism revenues; an increase in the consumer price index (CPI) → decrease in tourism revenues.
(Wijijayanti, 2021)	FMOLS, DOLS, Granger causality; Malaysia, Indonesia, Philippines, Thailand, Singapore, Myanmar, Cambodia, Laos; (1995-2018);	- Long-run relationship among economic growth, domestic tourism expenditure, and international receipts - No short-run causal relationship in either direction
(Seetanah, 2011)	Augmented Solow growth model, GMM, Panel Granger causality; 19 island economies; (1990–2007);	- Tourism revenues to GDP ratio make a significant contribution to economic growth -Bidirectional causality exists between tourism revenues to GDP ratio and investment to GDP ratio - Bidirectional causality exists between tourism revenues to GDP ratio and EG
(Huseynli, 2024)	Panel Data Analysis- Driscoll-Kraay Estimation; Selected Balkan countries; (2005–2020);	- No significant relationship was found between tourism revenues and economic growth. - Inflation rates have a negative impact on economic growth.
(Dritsakis, 2004)	Greece; VAR, ECM, Johansen Cointegration, Granger Causality; (1960:I–2000:IV);	- Cointegration analysis confirms a long-run positive relationship among GDP, international tourism receipts, and real effective exchange rate - International tourism receipts and real exchange rate → strongly affect economic growth - Economic growth and real exchange rate → affect international tourism receipts only through simple causality
(Oh, 2005)	Bivariate VAR model and Granger causality test; Korea (1975-2001)	- No evidence of a long-term linkage between tourism and economic growth
(Ekanayake & Long, 2012)	Granger causality, FMOLS; 140 developing countries; (1995-2009)	- No long-run relationship among GDP, labor, capital, and tourism receipts - No short-run causality from labor to tourism receipts - GDP and capital have one-way short-run causality on tourism receipts
(Melece & Ruciņš, 2012)	Lithuania, Latvia, Estonia; Panel Correlation analysis; (2009–2018);	- Lithuania and Estonia: strong positive relationship between tourism and economic growth (GDP and employment). - Latvia: no statistically significant relationship.

DATA, MODEL, AND METHODOLOGY

This study comprehensively examines the short-run demand-driven and long-run supply-driven dynamics of tourism on employment in the Black Sea region. In the short term, within the Keynesian framework, increases in ITR are shown to stimulate aggregate demand, directly boosting employment in the tourism sector. CIT, however, exhibit delayed and limited short-term effects due to time-intensive processes such as planning, construction, and equipment procurement. In the long run, the Solow growth model highlights that CIT enhances productive capacity, generating sustainable and enduring effects on employment. Furthermore, rising ITR foster firms' investment tendencies in the tourism sector, promoting capital accumulation and consequently increasing labor demand over time. To empirically test these mechanisms, the study covers six Black Sea countries over the period 1995–2024 and employs the AMG estimator to capture heterogeneous short- and long-run effects across countries. This approach allows a rigorous assessment of the Keynesian hypothesis in the short run and the Solow hypothesis in the long run (Magnani, 2015).

Data

Panel data from Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine covering the period 1995–2024 are employed to analyze the dynamics of the tourism sector. The Keynesian economic framework is adopted for short-term analysis, while the Solow framework is utilized for long-term perspective. This approach guides the examination of the short- and long-run influences of CIT and ITR on the DET sector, as well as the resilience of employment to fluctuations and shocks in these independent variables. CIT and ITR are measured in current U.S. dollars, whereas DET is represented by the number of persons employed in the sector. The data is obtained from reliable international and national sources, including the World Bank, CEIC Data, WTTC, and national statistical agencies. To mitigate scale differences among variables and enhance the interpretability of proportional relationships, all data have been transformed into logarithmic form.

Model

Considering the short- and long-term effects of CIT and ITR on DET, the following model is developed within the framework of Keynesian and Solow growth theories (Baltagi, 2005).

$$lnDET_{it} = \beta_0 + \beta_1 lngCIT_{it} + \beta_2 lnITR_{it} + u_{it} \qquad (1)$$

where β_1 and β_2 capture the impacts of CIT and ITR on DET, respectively, and u_{it} represents the error term. The short- and long-term effects of the independent variables in the model differ according to Keynesian growth theory in the short run and Solow growth theory in the long run. In the short run, in line with the Keynesian perspective, demand-driven increases—especially the growth in ITR—have a swift and positive effect on DET (Keynes, 1936). Conversely, the influence of CIT on DET tends to be limited or statistically insignificant in the short term. In the long run, from the perspective of the Solow growth model, CIT supports the expansion of production capacity and technological advancement, while ITR contributes to the sustainable increase in DET, thereby maintaining their positive effect (Solow, 1956).

METHODOLOGY

In this study, all variables were first transformed into logarithms to mitigate scale differences and facilitate meaningful interpretation of proportional relationships; subsequently, cross-sectional dependence (Pesaran CD, Pesaran Scaled LM, Breusch-Pagan LM) and slope homogeneity (Pesaran-Yamagata delta test) were assessed, and unit root tests (CIPS) were conducted to examine the stationarity of the variables. Long-run cointegration relationships were then identified using the bootstrap LM panel test, and short- and long-run effects were estimated through the AMG estimator, accounting for heterogeneity, to evaluate the short-run demand-driven Keynesian hypothesis and the long-run supply-driven Solow hypothesis (Baghirov et al., 2025). This methodological approach allows for a comprehensive and reliable assessment of the effects of CIT and ITR on DET over both the short and long term.

Cross-Sectional Dependence Tests

In empirical studies testing long-run relationships using panel data analysis, it is essential to detect cross-sectional dependence between units. Therefore, in the analysis process, Pesaran CD, Pesaran Scaled LM, and Breusch-Pagan LM tests are applied both at the variable level and within the framework of a model based on the extended Keynesian and Solow hypothesis to determine whether cross-sectional dependence exists among panel units. The mathematical formula of the test statistics proposed by Breusch & Pagan (1980) to test for cross-sectional dependence for the variables used in the analysis and the model in Equation 1 is shown below (Breusch & Pagan, 1980).

$$\mathrm{CD_{LM}} = T\sum_{i=1}^{N-1}\sum_{J=i+1}^{N}\hat{p}_{ij}^{2} \qquad (2)$$

Here, $\hat{p}_{ij}^{2}$ denotes the correlation coefficient between the error terms of units i and j. The test statistics are asymptotically distributed as a chi-square x^2 variable with $N(N-1)/2$ degrees of freedom. Pesaran (2004) introduced an alternative test statistic because the one computed in Equation 2 may produce misleading outcomes in large samples (Pesaran, 2004)**:**

$$\mathrm{CD_{LM1}} = \sqrt{\frac{1}{N(N-1)}}\sum_{i=1}^{N-1}\sum_{J=i+1}^{N}(T\,\hat{p}_{ij}^{2}-1) \qquad (3)$$

Accordingly, Pesaran (2004) refined the LM statistics in Equation (2) and proposed the $\mathrm{CD_{LM1}}$ test, which enables a more reliable assessment of cross-sectional dependence on large samples. In addition, Equation 4 is restructured by considering cases where the number of units (N) is larger than the time dimension (T) and an alternative test statistic is developed in this framework (Pesaran, 2004).

$$\mathrm{CD_{LM2}} = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{J=i+1}^{N}\widehat{p}_{ij}\right) \qquad (4)$$

In Equation (4), $\mathrm{CD_{LM2}}$ is a **unit-free** cross-sectional dependence test statistic, where T denotes the number of time periods, NNN denotes the number of cross-sectional units, i and j represent unit indices, and $\widehat{p}_{ij}$ is the pairwise correlation coefficient between the residuals of units i and j; accordingly, the null hypothesis implies **no cross-sectional dependence**, while the alternative indicates its existence (Yerdelen Tatoğlu, 2020).

Slope Homogeneity Tests

In this study, delta tests proposed by Pesaran & Yamagata (2008) are used to test the homogeneity of slope coefficients in panel data models. These tests are improved versions of the classical Swamy (1970) method and provide appropriate results for both large and small sample sizes (Pesaran & Yamagata, 2008). Delta tests test the alternative hypothesis of heterogeneity against the null hypothesis that slopes are homogeneous. The test statistics allow us to reliably determine whether the slope coefficients are homogeneous. The first delta test statistics, formulated as an extension of Swamy's (1970) methodology, is computed as follows (Swamy, 1970):

$$\hat{\Delta} = \sqrt{N}\left(\frac{N^{-1}\tilde{s}-k}{\sqrt{2k}}\right) \qquad (5)$$

In this context, S represents the modified Swamy statistic, and assuming normally distributed errors, the delta test statistics are adjusted to correct mean and variance biases (Pesaran & Yamagata, 2008).

$$\hat{\Delta}_{adj} = \sqrt{N}\left(\frac{N^{-1}\tilde{s}-E(\tilde{z}_{i\hat{t}})}{\sqrt{var(\tilde{z}_{i\hat{t}})}}\right) \qquad (6)$$

Hera, $E(\tilde{z}_{i\hat{t}}) = k,\ var(\tilde{z}_{i\hat{t}}) = 2k(T-k-1)/(T+1)$ For both test statistics, the null hypothesis suggests that the slopes are homogeneous, while the alternative hypothesis indicates that they are heterogeneous.

Cips Panel Unit Root Test

Pesaran's (2007) CIPS test is a second-generation panel unit root test that considers unit heterogeneity and cross-sectional dependence. It is based on the CADF statistics computed separately for each cross-sectional unit. The CIPS statistics are calculated as the simple average of individual CADF statistics and are applicable in both large - N and large -T panels. The formulation of the CIPS test is as follows (Pesaran, 2007):

$$\text{CIPS}\,(\text{N},\text{T}) = \text{t} - \text{bar} = \frac{1}{\text{N}}\sum_{\text{i}=1}^{\text{N}} \text{t}_{\text{i}}\,(\text{N},\text{T}) \quad or \quad \text{CIPS} = \frac{1}{\text{N}}\sum_{\text{i}=1}^{\text{N}} \text{CADF}_i \qquad (7)$$

Thus, $\text{t}_{\text{i}}\,(\text{N},\text{T})$is the CADF test statistic derived for each unit in the panel. The calculated CIPS value is compared with the critical values provided by Pesaran based on Monte Carlo simulations. When the test statistic surpasses the critical threshold, it leads to rejecting the null hypothesis of a unit root, which implies that the series is stationary (Yerdelen Tatoğlu, 2020).

Panel Cointegration Tests

Conventional panel cointegration tests do not account for cross-sectional dependence, which particularly undermines the reliability of results in small samples. To address these limitations, Westerlund & Edgerton proposed a bootstrap-based LM panel cointegration test building upon the method of (McCoskey & Kao, 1998). This approach effectively mitigates issues related to cross-sectional dependence and small sample sizes. Cointegration among variables is assessed using the LM statistics in this test (Westerlund & Edgerton, 2007).

$$LM_N^{+} = \frac{1}{NT^2}\sum_{i=1}^{N}\sum_{t=1}^{T} \widehat{w}_i^{-2} S_{it}^2 \qquad (8)$$

Here, N denotes the sample size, T the time dimension, $\widehat{w}_i$ the long-run variance of residuals, and S_{it}^2 the partial sum of error terms. The null hypothesis of the test posits the existence of cointegration among the cross-sectional units Wang et al. 2020.

FINDINGS

Within the scope of this study, tests for cross-sectional dependence and homogeneity were conducted on the panel dataset, revealing the presence of cross-sectional dependence and heterogeneity both among the variables and within the overall model. Subsequently, panel unit root tests were applied, indicating that all variables become stationary at their first differences. Thereafter, panel cointegration tests confirmed the existence of a long-run relationship between independent and dependent variables. Finally, to examine the validity of the short-term Keynesian and long-term Solow growth models, the AMG estimator—accounting for cross-country heterogeneity and common dynamic shocks—was employed. Cross-Section Dependence and Homogeneity Test Results are presented below in Table 2.

Table 2. Cross-Section Dependence and Homogeneity Test Results (*Rejects the null hypothesis at the 1% significance level)

Variables	Breusch-Pagan LM	Pesaran scaled LM	Pesaran CD
LnDET	47.12436*	5.865079*	-0.591219
LnCIT	268.7463*	46.32753*	15.62098*
LnITR	226.1162*	38.54436*	14.60076*
MODEL	76.63156*	11.25233*	2.687653*
Slope Homogeneity Test Results		$\hat{\Delta}$	$\hat{\Delta}_{adj}$
		7.802*	8.380*

In this study, cross-sectional dependence of the variables and the model, constructed within the framework of the Keynesian approach in the short run and the Solow growth model in the long run, was examined using the Pesaran (2004) CD test, Breusch-Pagan (1980) LM test, and Pesaran (2004) scaled LM test, while slope homogeneity was tested with the Delta and Deltaadj tests. Prior to the unit root analysis, the logarithmic structures of the variables were visually examined by country and group to determine the appropriate specification (constant or constant and trend) for the panel unit root tests. The graphical inspection presented in Figure 1 did not reveal a clear deterministic trend in the series.

Therefore, the subsequent panel unit root tests were conducted under the specification including only a constant term. Figure 1 presents the logarithmic structure analysis of the variables by country and group. According to the findings presented in Table 2, the results of the cross-sectional dependence and homogeneity tests indicate the presence of cross-sectional dependence and heterogeneity in both the variables (except for the DET variable in the Pesaran CD test) and the overall model. Thus, the model will be estimated using second-generation heterogeneous panel data methods that account for cross-sectional dependence and heterogeneity. The CIPS Panel Unit Root Test Results are presented in Table 3.

Table 3. CIPS Panel Unit Root Test Results (*Rejects the null hypothesis at the 1% significance level)

Variables	Level I(0)		I Differences I(1)	
LnDET	-2.130		-5.452 *	
LnCIT	-2.019		-4.773*	
LnITR	-1.354		-4.713*	
Critical values	10%	5%		1%
	-2.21	-2.33		-2.57

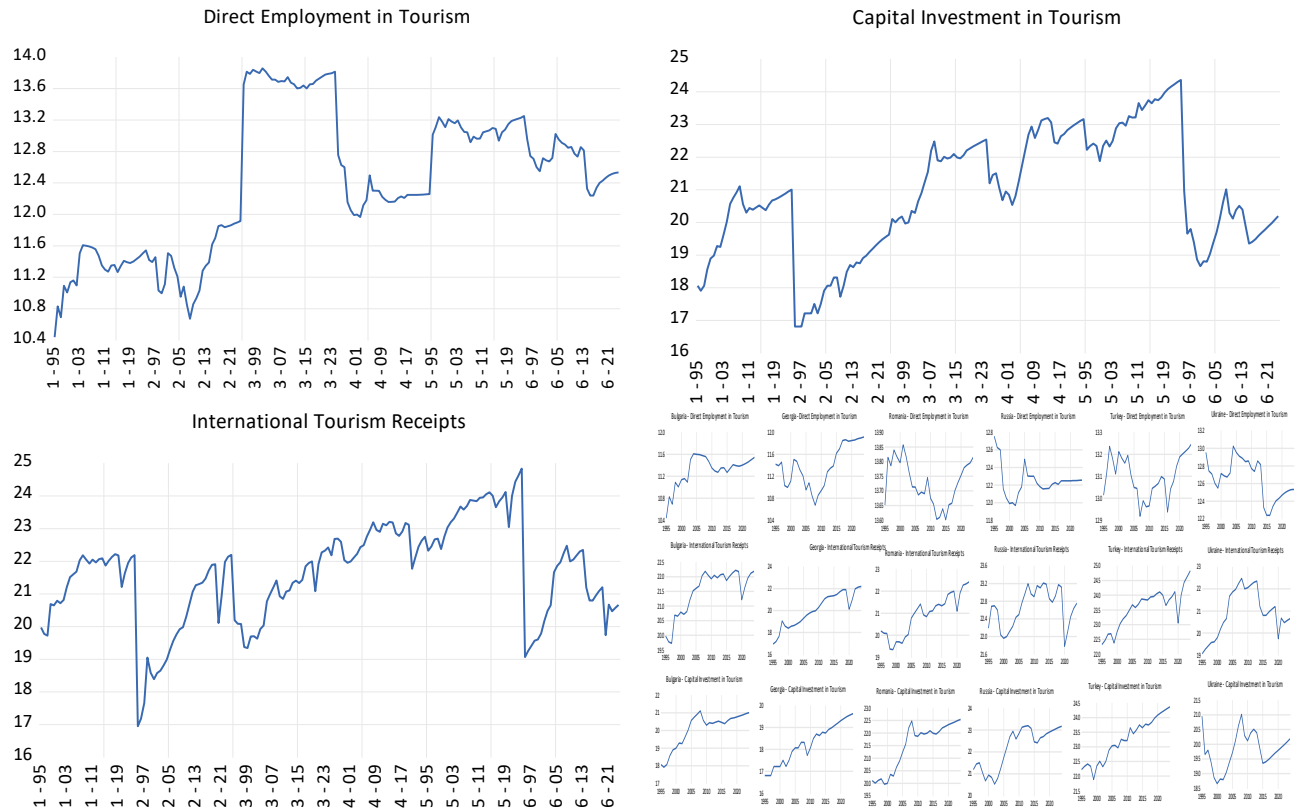

Figure 1. Logarithmic Structure Analysis of Variables by Country and Group

According to the CIPS panel unit root test results presented in Table 3, all variables are found to be non-stationary at their level values. However, after taking the first differences, all variables become stationary at various significance levels. These findings indicate that the variables are integrated in order one, I(1). Since the variables exhibit the same order of integration, the existence of a long-run relationship among them can be further investigated through panel cointegration analysis. The LM Bootstrap Panel Cointegration Test Results are presented in Table 4.

Table 4. LM bootstrap Panel Cointegration Test Results (Note: The bootstrap is based on 1000 replications)

Conditions	**LM statistics**	**Bootstrap p-value**
Constant	1.148*	0.446

The LM bootstrap panel cointegration test results indicate the existence of a long-run equilibrium relationship among CIT, ITR, and DET sector. In the short run, the Keynesian demand-driven approach explains the positive impact of investments and receipts on employment. The persistence of demand effects gradually transforming into structural relationships support the continuity of this cointegration. In the long run, within the framework of Solow's neoclassical growth model, the presence of a long-run equilibrium relationship among CIT, ITR, and DET corroborates the theoretical foundation. Accordingly, both the short-run Keynesian hypothesis and the long-run Solow model are consistently supported by the empirical findings (Magnani, 2015). In this study, the relationships between CIT, ITR, and DET sector are analyzed using the AMG estimator applied to a panel dataset. The analysis is conducted within the framework of the Keynesian approach in the short run and the Solow growth model in the long run. The AMG method is an effective estimation technique for identifying reliable long-run relationships, as it accounts for cross-country heterogeneity and common dynamic shocks (Eberhardt & Bond, 2009; Teal & Eberhardt, 2010). Table 5 presents the results of the AMG estimator, showing both short- and long-term coefficients for the overall model as well as for individual countries.

Table 5. Results of the Augmented Mean Group (AMG) Estimator
*, **, and *** rejects the null hypothesis at the 1%, %5, and %10 significance level, respectively

	Shock	**Cons**	**Short -Term**		**Long-Term**	
			CIT	ITR	CIT	ITR
Model	-0.669*	4.211*	0.080	0.120*	0.127*	0.082*
Bulgaria	-0.604*	0.997	0.254*	0.260*	0.183*	0.113***
Georgia	-0.409*	1.469	-0.141	0.082	0.016	0.158***
Romania	-0.644*	6.422***	0.009	-0.002	0.120***	0.006
Russia	-0.619*	2.133	0.241*	0.092	0.152*	0.101
Turkey	-1.112*	10.974*	0.019	0.097**	0.150*	0.016
Ukraine	-0.624*	3.268*	0.099	0.191*	0.141*	0.099*

According to the results presented in Table 5 from the AMG estimator, the model demonstrates a high level of statistical significance and a low Root Mean Squared Error indicating strong explanatory power and predictive accuracy, as well as a robust fit to the dataset. Short-term increases in ITR have a positive and significant effect on DET, indicating that sudden demand surges particularly raise labor demand in the service sector. In contrast, the short-term impact of CIT is statistically insignificant, likely due to the time-consuming nature of planning and infrastructure development processes, which limits a rapid and direct increase in DET in the short run. Thus, in line with the Keynesian approach, the hypotheses that increases in ITR representing service exports—have a significant short-term effect on DET, while the direct employment impact of CIT remains limited, are confirmed. In the long run, CIT and ITR have been observed to exert significant and positive effects on DET sector. CIT improves infrastructure and service capacity, thereby making lasting contributions to the economic structure and enabling sustainable employment growth, while ITR positively influences DET by supporting sectoral expansion through foreign exchange inflows and economic growth. These findings are consistent with the neoclassical Solow growth model, which posits that capital investments and productive factors are fundamental determinants of long-term economic growth. Thus, based on the results of the long-run AMG estimator, our model can be formulated as follows.

$$lnDET_{it} = 4.211 + 0.127 * lngCIT_{it} + 0.082 * lnITR_{it} + u_{it} \qquad (9)$$

The positive and statistically significant constant term of 4.2105 indicates a fundamental and stable baseline level of DET sector when all independent variables are equal to zero. The results further reveal that a 1% increase in CIT is associated with an approximately 0.127% increase in DET, while a 1% increase in ITR corresponds to an increase of about 0.082% in DET. The impact of ITR on DET is stronger in the short term (0.120) and weaker in the long term (0.082).

The effectiveness of the error correction mechanism (ECM) indicates that employment rapidly and steadily returns to its long-run equilibrium following short-term fluctuations. The error correction term associated with the variables in the model is negative and statistically significant (approximately -0.669), confirming the existence of a long-run equilibrium relationship. This coefficient implies that approximately 66.9% of the short-term disequilibria are corrected in each period, allowing the system to converge to its long-run equilibrium within an average of 1.5 years. Therefore, deviations in employment are quickly and effectively adjusted, ensuring convergence to the long-run equilibrium. The error correction coefficients (ECM) presented in the table are negative and statistically significant across all countries, confirming the presence of a long run cointegration relationship between independent and dependent variables. These coefficients reflect the speed at which short-term deviations are corrected. Turkey exhibits the highest adjustment speed with an ECM value of -1.112, corresponding to an estimated equilibrium convergence period of approximately 0.90 years. Romania, Russia, Ukraine, and Bulgaria show similar adjustment speeds of around 60%, with convergence periods ranging between 1.55 and 1.66 years.

In contrast, Georgia demonstrates a relatively lower adjustment speed, with an estimated convergence period of approximately 2.44 years. These findings indicate that Turkey recovers from short-term shocks more rapidly compared to the other countries in the sample. In Turkey, Ukraine, and Bulgaria, the short-term effects of ITR on DET are significant and positive, supporting the Keynesian approach. However, although CIT has significant and positive effects on DET in Bulgaria and Russia, these findings suggest that the Keynesian framework does not hold for CIT in the short term. In contrast, neither variable shows statistically significant effects on DET in Georgia and Romania. From a long-term perspective, it is concluded that CIT has a significant and positive effect on DET in all countries except Georgia. This finding supports the Solow growth model, which explains long-term economic growth through capital accumulation. In terms of ITR, Bulgaria, Georgia, and Ukraine exhibit significant and positive long-run effects of ITR on DET, indicating consistency with the Solow framework.

In contrast, the long-term effects of ITR on DET are not statistically significant in other countries. In Romania, Turkey, and Ukraine, the statistically significant constant terms indicate the presence of a structurally stable level of DET, suggesting that the tourism sector in these countries maintains a certain degree of employment independently of external variables. To provide a clearer illustration of the empirical findings, Figure 2 summarizes the short- and long-term effects of international tourism receipts (ITR) and capital investment in tourism (CIT) on tourism employment (DET) in the Black Sea region. The figure presents the relationships identified by the AMG estimator within the framework of the Keynesian approach in the short run and the Solow growth model in the long run. Figure 2 summarizes the short- and long-term effects of international tourism receipts (ITR) and tourism capital investment (CIT) on tourism employment (DET) in the Black Sea region. The findings indicate that ITR exerts a significant positive effect on DET in the short run, whereas the effect of CIT becomes evident only in the long run. Furthermore, both ITR and CIT are found to contribute positively to DET in the long run, providing support for the predictions of the Keynesian approach in the short term and the Solow growth model in the long term.

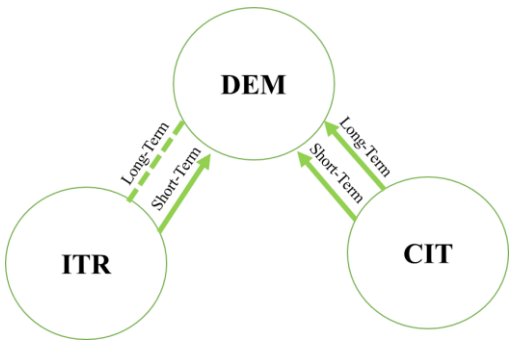

Figure 2. The short- and Long-Term effects of ITR and CIT on DET Factors for the Black Sea

CONCLUSION

This study examines the short- and long-term effects of ITR and CIT on DET across six countries in the Black Sea region. In the short term, consistent with the Keynesian approach, sudden increases in demand significantly boost employment through ITR, while CIT does not have an immediate effect due to the time needed for infrastructure and investment processes. In the long term, both CIT and ITR positively and significantly enhance DET, aligning with the neoclassical Solow growth model that emphasizes capital accumulation and productive factors in sustainable employment growth.

The error correction mechanism is strong, with Turkey showing the fastest adjustment to equilibrium. Country-level analysis reveals that in the short term, ITR positively and significantly affects employment in Turkey, Ukraine, and Bulgaria, while CIT's short-term impact is significant only in Bulgaria and Russia. In Georgia and Romania, short-term effects of both variables are not significant. Long-term CIT effects are significant and positive in all countries except Georgia, whereas ITR's long-term impact is significant in Bulgaria, Georgia, and Ukraine. Significant intercepts in Romania, Turkey, and Ukraine indicate structurally stable tourism employment levels, largely independent of external shocks.

The short-run positive effect of ITR on employment supports the demand-driven Keynesian findings of Kum et al. (2015) and aligns with Dritsakis (2004), who demonstrated the short-term influence of tourism revenues on economic growth. Similarly, Anis et al. (2023) found that tourism revenues and investment generate bidirectional causality with growth and employment in the short run. In contrast, studies such as Oh (2005) and Ekanayake & Long (2012) found no significant short-run relationship, which explains the limited short-term impact of CIT. In the long run, the significant positive effects of CIT and ITR on employment are consistent with the findings of Fayissa et al. (2008, 2011), Seetanah (2011), and Nguyen et al. (2024), all of which emphasize that tourism revenues and investments foster sustainable growth through capital accumulation. Similarly, Sarkhanova & Baghirov (2023) and Baghirov & Sarkhanov (2023) reported lasting positive effects of tourism revenues on macroeconomic indicators, while Wijijayanti (2021), Melece & Ruciņš (2012), and Dritsakis (2004) also confirmed strong long-run relationships between tourism and economic growth, thereby supporting the Solow growth framework. Overall, the short-run findings of the study are in line with the Keynesian demand-side hypothesis, whereas the long-run results confirm the Solow model of capital accumulation–driven growth, demonstrating full consistency with the broader empirical literature.

Flexible employment and training support are needed for the rapid translation of short-term tourism demand increases into employment, while capital investments should focus on expanding infrastructure and capacity in the long term.

At the country level, marketing efforts are prioritized in Turkey, Ukraine, and Bulgaria for the short term, whereas long-term investments are supported in Georgia. Although tourism employment dynamics vary across countries, Keynesian demand effects dominate in the short term, while neoclassical capital investment models generally apply in the long term.

This article is intended to serve as a comprehensive resource for future researchers and policymakers by providing in-depth insights into the short- and long-term dynamics of tourism employment. Its findings highlight the importance of tailored strategies that account for country-specific differences, thereby informing effective policy design and targeted interventions to foster sustainable employment growth in the tourism sector; however, these implications should be interpreted with caution due to limitations related to the sample scope (countries and period), potential measurement constraints in tourism indicators, and the omission of some structural factors that may also shape employment dynamics.

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