National Accounting Review

NAR, 4(3): 310–328.
DOI: 10.3934/NAR.2022018
Received: 09 July 2022
Revised: 07 September 2022
Accepted: 09 September 2022
Published: 19 September 2022

http://www.aimspress.com/journal/NAR

Research article

GDP growth rate, tourism expansion and labor market dynamics: Applied research focused on the Italian economy

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Abstract: This paper focuses on the Italian economy and investigates the causal nexus between economic growth, tourism development and labor market dynamics. We performed a two-step analysis. In the first step, we evaluate whether tourism stimulates Italian economic growth or if it is the economic growth that promotes tourism expansion. To get the goal, we use panel data from 1997 to 2019 concerning the GDP and overnight stays in each Italian region. We performed the Granger causality test on the whole panel and analyzed a panelvar model. In the second step, after having established the relationship between the two variables of interest, we extended our analysis to investigate—throughout the estimate of the employment intensity of growth and the impact of GDP growth on employment, at both aggregate and disaggregate level. The main findings of our analysis are as follows: a) the existence of a unidirectional causality going from economic growth to tourism development (i.e., validation of economic-driven tourism growth hypothesis), and b) a significant estimated magnitude of the (average) employment intensity of growth.

Keywords: tourism sector; economic growth; panelvar models; GMM estimators; employment intensity of growth

JEL Codes: C51, J69, L830, O47

1. Introduction

Tourism is not identifiable in a single unitary industry; its economic effects impact many sectors, such as transportation, accommodation, food services and recreational services, to cite a few. Such widespread economic benefits, jointly with the growing relevance of the phenomenon worldwide, have stimulated scholars' interest in measuring the contribution of tourism to economic growth.

Most studies focus on the role of inbound tourism, contributing to gross domestic product (GDP) just as exports, and sometimes neglecting the impact of domestic tourism. Although foreign tourism entrances have been growing worldwide in the last few decades, domestic tourism also plays a crucial role in economic growth. This is because the expenditures of domestic tourists jointly with those done by tourism employees are accounted for in the final consumption of the households; hence, as part of aggregate demand, they contribute to the national income.

Since the seminal study by Balaguer and Cantavella-Jorda in 2002, many scholars have analyzed the causal relationship between tourism and economic growth. Does tourism development stimulate economic growth or, on the contrary, does economic growth lead to tourism development? No univocal answer to the question was found. While finding different causal relationships for different countries is reasonable, heterogeneous results have also been found for the same country due to the variables used, the time series length and the methodologies.

Tourism has been proved to be a powerful vehicle for the development of many countries, contributing to global employment and income (Sharpley, 2022). However, the effects on employment could have two drawbacks. First, tourism is a labor-intensive industry with low productivity; accordingly, tourism development could provoke a switch in resources from high productive sectors to the tourism sector (Chiu and Yeh, 2017), generating a kind of Dutch disease. Second, due to seasonality in tourism (Vergori, 2017), most of the available jobs could be temporary, which could create uncertainty.

This paper focuses on the Italian economy and investigates the causal nexus between economic growth, tourism development and labor market dynamics. We performed a two-step analysis. In the first step, we evaluated whether tourism stimulates Italian economic growth, or if it is the economic growth that promotes tourism expansion. To achieve the goal, we used panel data from 1997 to 2019 concerning the GDP and overnight stays in each Italian region. Regional data should allow us to obtain more accurate results than aggregate national data. We performed a Granger causality test on the whole panel and analyzed a panelvar (PVAR) model. In the second step, after having established the relationship between the two variables of interest, we extended our analysis, using the estimate of the employment intensity of growth to investigate the impact of GDP growth on employment, taking into account both the aggregate and disaggregate labor markets by sector.

This kind of analysis is of particular interest in this historic period due to the considerable funds that Italy and other European countries have received from the European Union, via the Next Generation EU program, to recover their economy from the effects of the pandemic. The Italian government envisages allocating more than six billion Euros (out of 205 billion) to culture and tourism, which are considered among the key sectors to recover the Italian economy from the crisis generated by the pandemic.

2. Literature review

The relationship between tourism development and economic growth has been widely analyzed in the last two decades. Since the seminal contribution of Balaguer and Cantavella-Jorda (2002), various literature reviews on the topic have been published (Ivanov and Webster, 2013; Pablo-Romero and Molina, 2013; Brida et al., 2016; Fonseca and Sanchez-Rivero, 2019). The linkages between the two variables are not stable over time due to structural changes in the time series (e.g., Antonakakis et al. 2019; Shahbaz et al. 2017). Accordingly, different results (in terms of direction and magnitude of the relationship) have also been obtained by scholars for the same country. Furthermore, countries with different levels of tourism specialization tend to exhibit different tourism-growth nexuses (Chiu and Yeh, 2017).

While the real GDP is generally used to measure economic growth, three variables are used as proxies for tourism development, i.e., international tourist arrivals or overnight stays, international tourism receipts and tourism expenditures. The latter are used singularly, separately or in weighted indexes.

Generally, using the Granger causality test to investigate the causality nexus between tourism and economic growth leads to the validation of one of the four hypotheses identified in the literature. The tourism-led economic growth (TLEG) hypothesis implies a unidirectional causality from tourism to economic growth. In this case, tourism development is one of the main determinants of economic growth. Studying international tourism, many scholars validated this hypothesis. Indeed, for related factors such as goods and services export, inbound tourism behaves as an exogenous component of the aggregate demand, having a multiplicative effect on the tourist destination's GDP. Various studies have proved the validity of this hypothesis. Proença and Soukiazis (2008) confirmed the tourism-led growth hypothesis for Greece, Italy, Portugal and Spain for the period of 1990–2014 by using the Barro and Sala-i-Martin conditional convergence approach. Brida et al. (2016) validated the tourism-led growth hypothesis for Italy (years 1954–2000) and Spain (from 1964 to 2000). The TLEG hypothesis has also been confirmed for Italy and Spain for the years from 1998 to 2011 by Tugcu (2014), who used both tourism receipts and tourism expenditures as proxies for tourism growth. Some studies have highlighted that tourism development can boost economic growth in developing or the least developed countries, but not in developed countries (see Eugenio-Martin et al., 2004; Cardenas-Garcia et al., 2015). Chen and Chiou-Wei (2009) also found evidence of the TLEG hypothesis in Taiwan.

The second hypothesis tested in the literature for the causality nexus between tourism growth and economic growth is the economic-driven tourism growth (EDTG) one. According to this hypothesis, there is a unidirectional causality going from economic growth to tourism development. Aslan (2013) applied the Granger causality approach to a panel of Mediterranean countries for the period going from 1995 to 2010. He validated the EDTG hypothesis for six out of the 12 countries analyzed, among which were Italy, Greece and Spain. Massidda and Mattana (2012) applied a structural vector error correction model to the quarterly Italian data from 1987 to 2009. In the short-run, the EDTG hypothesis emerged, while, in the long run, the authors found a bidirectional relationship. Bidirectional causality is another hypothesis often found in the literature; it is known as the feedback hypothesis. Dogru and Bulut (2008) also validated the feedback hypothesis for seven European countries from 1996 to 2014. Using data from the first quarter of 1990 to the fourth quarter 2015, Shahbaz et al. (2017) applied a bootstrap rolling window Granger causality approach to prove the existence of a bidirectional Granger causality for Italy, Mexico, the UK and the USA.

The fourth hypothesis found in the literature is the neutrality one. In this case, no relationship between tourism development and economic growth emerges. Some examples are China, France, Germany and Turkey, according to Shahbaz et al. (2017), and some African countries, according to the results by Tugcu (2014).

Most of the studies that involved Granger causality analysis focused on national data; however, it is worth stressing the importance of studying the role played by tourism in economic development at sub-national levels (see, for example, Cortés-Jiménez, 2008; Centinaio et al., 2022). This kind of analysis, although desirable, is not always possible due to data availability. Even if our research is performed at the national level, however, the panel data are at the NUTS 2 level. This aspect is not marginal because it allows us to have more accurate information than the studies using aggregate national data.

3. Database description

We use data collected by the Italian Institute of Statistics. Panel data concerning the real total GDP, the tourist overnight stays (TOS) and the employment level for the 20 Italian regions over the period of 1997–2019. We gathered data at the regional level to have a more extended time series.

Although we use the real GDP as a measure of economic growth, following the main literature (e.g., Antonakakis et al., 2019; Tugcu, 2014; Brida et al., 2016), we have also made alternative estimations using per capita GDP growth rate (PGDP). The use of the PGDP allows us to investigate the effect of tourism development on the Italian standard of living. However, the outcomes of this alternative analysis are almost identical to those obtained by using the GDP growth rate (see Footnote 3 below). The explanation of this result must be traced back to the very low Italian population growth rate over the period considered, which makes the two growth rates almost similar. Actually, over the period of 1997–2019, the average population growth rate has been equal to 6.5%, while the yearly growth rate over the same period has always been below 0.7%, becoming negative over the periods of 1995–1999 and 2018–2019.

As hinted in the previous section, the different variables were used as proxies for tourism development in previous studies. When the analysis focuses on inbound tourism, scholars tend to use data on international expenditures because they are generally available and allow them to catch the monetary aspect of tourism flows. Since foreign and domestic tourism are both equally important in Italy, we are interested in analyzing the whole phenomenon. Unfortunately, this choice does not allow us to use data on tourism expenditures because of their unavailability; thus, we chose to represent tourism development through TOS data. As mentioned, overnight stays give us information about the number of tourists and the duration of their stay, unlike tourism arrivals, which only represent the number of tourists visiting a destination. Since tourism spending increases when the number of days of vacation increases, we believe that TOS data are a good proxy for the aim of our study.

Furthermore, data about employment were also analyzed to estimate the employment-GDP relationship. In particular, we split all of the data based on the number of employees in each region (EMPL), as shown in Table 1, as follows:

- EMPL_COMM: the number of employees in commerce, accommodation and service sectors (ATECO 2007 code, letters G and I);
- EMPL_SERV: the number of employees in the service sector net of the above defined EMPL_COMM sector (ATECO 2007 code, letters H and L–U);
- EMPL_IND: employment levels in the sectors covering the remaining economic activities (ATECO 2007 code, letters A–F).

Table 1 shows some descriptive statistics about the variables for GDP (values in thousands), TOS and EMPL. Furthermore, for the sake of completeness, in the same table, we have added the

PGDP values, which represent one of the main indicators of the standard of living in each of the various Italian regions.

The table shows the Italian regions grouped according to the macro-area of belonging. Looking at the PGDP values, we noticed that they tend to decrease moving from the north to the south of the peninsula. Regarding TOS, six regions account for 65% of the tourism flows in Italy; four of these regions belong to the north of Italy (Veneto, Trentino Alto Adige, Lombardy and Emilia Romagna), while two of the most touristic regions are in the center (Tuscany and Lazio). Finally, with reference to the employed in the Italian economy, about 54% of the total employed were found to be concentrated in five regions, four of which are in the north (Lombardy, Veneto, Emilia Romagna and Piedmont), and one (Lazio) in the center of Italy.

Table 1. Descriptive statistics.

	Regions	Variables	Mean	Stand. Dev.	Min	Max
North-West	Liguria	GDP (thousands)	50,176,783	2,179,560	46,652,960	53,903,768
		PGDP	31,838	1,440	29,723	34,278
		TOS	14,588,187	827,175	13,149,699	15,893,637
		EMPL	616,290	10,797	599,150	635,690
	Lombardy	GDP (thousands)	359,866,679	17,379,083	322,231,870	386,906,618
		PGDP	38,004	1,160	36,165	39,796
		TOS	30,212,698	5,816,343	22,839,872	40,482,939
		EMPL	4,180,800	159,070	3,858,400	4,483,100
	Piedmont	GDP (thousands)	131,934,361	4,915,177	125,164,231	140,630,528
		PGDP	30,606	1,392	28,461	32,816
		TOS	11,211,201	2,482,823	7,323,814	15,100,768
		EMPL	1,798,300	40,753	1,687,300	1,860,900
	Valle d'Aosta	GDP (thousands)	4,945,679	191,213	4,588,479	5,192,843
		PGDP	39,987	2,186	36,036	43,103
		TOS	3,265,181	189,031	2,981,002	3,625,616
		EMPL	55,697	965.56	54,423	58,013
North-East	Emilia Romagna	GDP (thousands)	146,705,551	7,590,858	128,944,968	157,372,139
		PGDP	34,885	1,245	33,012	37,206
		TOS	37,126,257	1,973,726	32,352,975	40,647,799
		EMPL	1,900,000	68,193	1,744,900	2,032,600
	Friuli V. G.	GDP (thousands)	36,765,202	1,420,600	34,025,237	39,556,732
		PGDP	30,528.7	1242.473	28,887.4	32,811.0
		TOS	8,568,500	546574	7,585,468	9,570,747
		EMPL	502,830	9,818	481,140	519,020

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	Regions	Variables	Mean	Stand. Dev.	Min	Max
	Trentino A.A.	GDP (thousands)	39,692,517	2,771,699	34,170,492	45,184,797
		PGDP	39,865	937	37,481	42,070
		TOS	42,607,174	4,725,492	35,978,061	52,074,506
		EMPL	453,780	28,560	405,380	499,390
	Veneto	GDP (thousands)	151,759,939	6,307,798	138,018,301	160,977,195
		PGDP	32,142	1,126	30,353	34,041
		TOS	58,845,262	7,759,813	41,918,281	71,236,630
		EMPL	2,054,500	73,433	1,880,000	2,166,900
Center	Lazio	GDP (thousands)	190,987,205	8,605,541	170,993,096	203,843,973
		PGDP	35,290	2,080	32,283	38,624
		TOS	29,814,210	4,489,686	21,061,286	39,029,255
		EMPL	2,141,200	178,360	1,834,900	2,385,900
	Marche	GDP (thousands)	40,886,074	1,893,522	36,861,242	44,622,187
		PGDP	27,174	1,297	25,352	29,655
		TOS	11,813,640	1,077,258	9,656,538	13,584,582
		EMPL	624,870	20,240	572,840	652,510
	Tuscany	GDP (thousands)	110,762,671	3,882,122	100,692,937	116,920,077
		PGDP	30,673	1,047	28,813	32,355
		TOS	40,541,696	4,456,336	31,448,543	48,077,301
		EMPL	1,524,100	48,058	1,412,700	1,602,200
	Umbria	GDP (thousands)	23,102,075	1,228,213	21,085,851	24,994,562
		PGDP	26,949	2,075	23,514	29,485
		TOS	5,606,037	672,163	3,682,822	6,252,102
		EMPL	347,640	12,889	315,280	367,210
South and Islands	Abruzzo	GDP (thousands)	32,184,291	823,203	30,435,023	33,472,276
		PGDP	24,918	793	23,840	26,396
		TOS	6,677,066	573,866	5,605,314	7,560,476
		EMPL	487,860	11,518	462,090	510,700
	Apulia	GDP (thousands)	73,714,536	2,620,842	69,511,582	77,693,357
		PGDP	18,233	712	17,148	19,298
		TOS	11,688,106	2,549,083	7,091,509	15,441,469
		EMPL	1,221,900	35,822	1,143,700	1,278,400
	Basilicata	GDP (thousands)	12,101,682	592,486	11,143,545	12,951,176
		PGDP	20,660.3	1132.296	18,699.8	22,836.8
		TOS	1,896,824	41,946	1,132,630	2,733,969

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Regions	Variables	Mean	Stand. Dev.	Min	Max
	EMPL	189,830	5,202.5	178,620	197,060
Calabria	GDP (thousands)	34,172,855	1,805,883	31,629,770	36,430,219
	PGDP	17,202.3	843.5722	15,992.0	18,514.8
	TOS	7,718,185	1,233,646	4,914,227	9,509,423
	EMPL	569,410	32,287	515,210	619,190
Campania	GDP (thousands)	110,030,993	5,363,081	101,171,868	118,366,938
	PGDP	19,109	1,047	17,534	20,629
	TOS	19,501,211	1,142,677	17,722,308	22,013,245
	EMPL	1,663,800	69,335	1,561,000	1,777,400
Molise	GDP (thousands)	6,865,584	546,871	5,987,374	7,581,996
	PGDP	21,646	1,495	19,024	23,902
	TOS	587,468	118,904	419,597	769,334
	EMPL	107,110	3,533.8	98,568	112,920
Sardinia	GDP (thousands)	34,105,439	1,090,425	32,260,827	35,906,865
	PGDP	20,779	747	19,563	21,898
	TOS	11,308,895	1,894,934	8,117,266	15,145,885
	EMPL	581,980	17,073	546,330	605,910
Sicily	GDP (thousands)	92,117,466	4,388,621	85,887,181	99,251,477
	PGDP	18,426	977	16,986	19,974
	TOS	13,701,788	1,203,423	10,292,337	15,135,259
	EMPL	1,411,400	51,873	1,321,700	1,493,600
ITALY	GDP (thousands)	1,684,821,471	58,517,597	1,545,758,634	1,778,792,031
	PGDP	28,741	1,059	27,178	30,551
	TOS	367,279,587	37,401,631	292,276,323	436,739,271
	EMPL	21,048,120	129,87	21,047,910	21,048,330

Source: Own elaboration of ISTAT data.

All of the variables show a gap between the north and south of the country. It is important to point out that a peculiar aspect of the divide is represented by the migration flows from southern regions toward central and northern regions (as well as toward foreign countries). This is nothing but the well-known adjustment mechanism based on the production factors mobility in the presence of areas characterized by different levels of economic growth. According to SVIMEZ (2019), in the period of 2000–2018 approximately 2 million residents left southern Italy, half of them young people up to age 34, and almost a fifth of them graduated. The main consequences of these flows are evident and can be summed up in the deterioration of human capital with the related decrease in potential GDP.

4. Granger causality analysis

Since we analyzed the relationship between tourism and economic growth, we will focus on the growth rates of the real total GDP (GDPgr) and TOS (TOSgr).

Before testing for the stationarity of both time series, we selected the optimal lag length according to the Akaike (AIC(n)), Schwarz (SC(n)), Hannan-Quinn (HQ(n)) and Final Prediction Error (FPE(n)) criteria. In accordance with the AIC, HQ, and PFE criteria, the optimal lag length was set as 2, while the SC criterion suggests that the optimal length is 1. We chose the optimal length to equal to 1 because it is the usual choice for annual data, and because the number of time periods of our panel is relatively small; however, for a robustness check, we also performed a PVAR regression with two lags (see Footnote 3 below). The Levin-Lin-Chu unit root test states that both series are stationary (with p-values$\approx$0), and this result is also corroborated by other Fisher-type tests, like the Hadri and Choi unit root tests (see Choi, 2001; Hadri, 2000; Levin et al., 2002).

About the Granger causality analysis, we have performed the test proposed by Dumitrescu-Hurlin (2012), computing also the intermediate Wbar statistics (average of individual Granger chi-square statistics). We found that the GDPgr ("Granger causes") to TOSgr was at a significance level near 0%, while there was no causality from TOSgr to GDPgr. However, if we run the Granger causality test assuming the panel data as a stacked set of data, and if we had relevant time dummies, there would be strong evidence of causality running both from GDPgr to TOSgr (p-value = 0.003) and from TOSgr to GDPgr (p-value = 0.046). We point out that this is a relevant finding since the Chow test for poolability of the data do not reject the null hypothesis of slope coefficient homogeneity across cross sections[1].

5. Models

Considering that our data cover various regions of the same country over two decades, we have performed a PVAR analysis, which stands as a combination of a dynamic panel model and a vector autoregressive model. The autoregressive structure of the model allows us to capture the lagged effects of each variable on itself and/or on the other variable. Since the presence of lagged dependent variables causes the ordinary least squares OLS estimator to be biased (the bias is of order $1/T$), in what follows, we use the generalized method of moments estimator (also known as the system GMM estimator) developed by Arellano and Bond (1991). The proliferation of instruments, which may cause bias estimation due to overidentification, is a matter of concern for the system GMM estimator (see Baum et al., 2003); in order to avoid this problem, we referred to Roodman's (2009) seminal paper, where the author shows how the number of instruments may be limited by "collapsing" them and reducing, at the same time, the number of lagged dependent variable instruments.

[1]The Dumitrescu-Hurlin panel causality test is suited for heterogeneous panels, since it is based on the assumption that all coefficients may be different across different cross sections. Furthermore, as has been stated, "the panel Granger causality analysis recently developed by Dumitrescu and Hurlin (2012), […] is superior to former panel Granger causality tests in terms of giving efficient results even in panels with small sample sizes, being applicable in unbalanced and/or cross-sectionally dependent panels without requiring any particular estimation, and allowing different lag orders for each cross-section unit" (Tugcu, 2014). For these reasons, the results of this test are usually reported in terms of econometric analyses dealing with dynamic panel models; in what follows, we will report the results of both tests.

We used the R package “panelvar” by Sigmund and Ferstl (2019) to obtain the results reported in Table 2. The model estimated is the following:

$$TOSgr_t = \alpha_{11}TOSgr_{t-1} + \alpha_{12}GDPgr_{t-1} + \frac{INV}{GDP_t} + PART_{RAT}E_t + \alpha_{15}d_{2009} + \alpha_{16}d_{2012} + \varepsilon_{1,t} \quad (1)$$

$$GDPgr_t = \alpha_{21}TOSgr_{t-1} + \alpha_{22}GDPgr_{t-1} + \frac{INV}{GDP_t} + PART_{RAT}E_t + \alpha_{25}d_{2009} + \alpha_{26}d_{2012} + \varepsilon_{2,t} \quad (2)$$

where *INV/GDP* and *PART_RATE* are two exogenous control variables that stand respectively for gross fixed capital formation as a percentage of GDP and labor force participation rate. In addition, d_{2009} and d_{2012} are two dummy variables for the years 2009 and 2012, respectively, and the corresponding economic recession engendered by the sovereign debt crisis. Although this latter crisis exploded in Italy in 2011, in terms of a decrease in aggregate demand and, particularly, in consumption, it had its most severe effects the following year (see Busetti and Cova, 2013).

In what follows, for robustness checking, we will report the results of both one-step and two-step GMM estimation[2] and, for comparative purposes, also the results of a standard fixed-effects OLS estimator. For the sake of brevity, we do not report the estimates of the control variable parameters. Standard errors are in brackets.

Table 2. PVAR results.

	$TOSgr_t$ FEOLS	GMM (one-step)	GMM (two-step)+	$GDPgr_t$ FEOLS	GMM (one-step)	GMM (two-step)+
$TOSgr_{t-1}$	0.0426	0.112**	0.118*	0.029*	0.035*	0.037
	(0.0513)	(0.046)	(0.067)	(0.016)	(0.018)	(0.023)
$GDPgr_{t-1}$	0.405****	0.426****	0.419****	0.152****	0.184****	0.197****
	(0.128)	(0.115)	(0.109)	(0.041)	(0.036)	(0.047)
Y2009	−3.013**	−2.807***	−2.087	−5.79****	−5.694****	−5.155****
	(1.317)	(0.885)	(1.315)	(0.430)	(0.477)	(0.623)
Y2012	−5.237****	−5.296****	−5.153****	−3.567****	−3.582****	−3.101****
	(1.289)	(1.012)	(0.920)	(0.421)	(0.362)	(0.537)
INV/GDP	0.028	0.024	−0.015	0.022	0.020	0.046
	(0.121)	(0.086)	(0.104)	(0.038)	(0.031)	(0.030)
PART_RATE	0.036	−0.027	0.014	−0.008	−0.051	−0.0003
	(0.166)	(0.110)	(0.139)	(0.052)	(0.045)	(0.056)

Note: **** p < 0.001; *** p < 0.01; ** p < 0.05; * < 0.1, +Hansen test of overidentification restrictions: chi2(8) = 12.83 Prob > chi2 = 0.118.

[2]For deeper insight into the GMM estimator and the related matter of overidentification restrictions, the reader is also referred to Abonazel (2016), Abrigo and Love (2016), Hwang and Sun (2018), Labra and Torrecillas (2018), Mehrhoff (2009) and Sigmund and Ferstl (2019).

In line with the Granger causality analysis performed before, the above regression results confirm a significant dependence of $TOSgr_t$ on $GDPgr_{t-1}$; actually, the $GDPgr_{t-1}$ coefficient is quite relevant and highly statistically significant. On the contrary, the increment in TOS at time *t*-1 seems to have a weak, almost negligible (if compared to α_{12} estimate), effect on the growth of GDP at time *t*. Furthermore, the above results show an autoregressive structure of both GDPgr and TOSgr, while the coefficients of the time dummy variables have the expected signs and are statistically significant[3].

5.1. Impulse response functions analysis

After having checked the stability of the model (i.e., after verifying that all eigenvalues lie inside the unit circle, which means that the PVAR is stable), we analyzed the generalized impulse response functions.

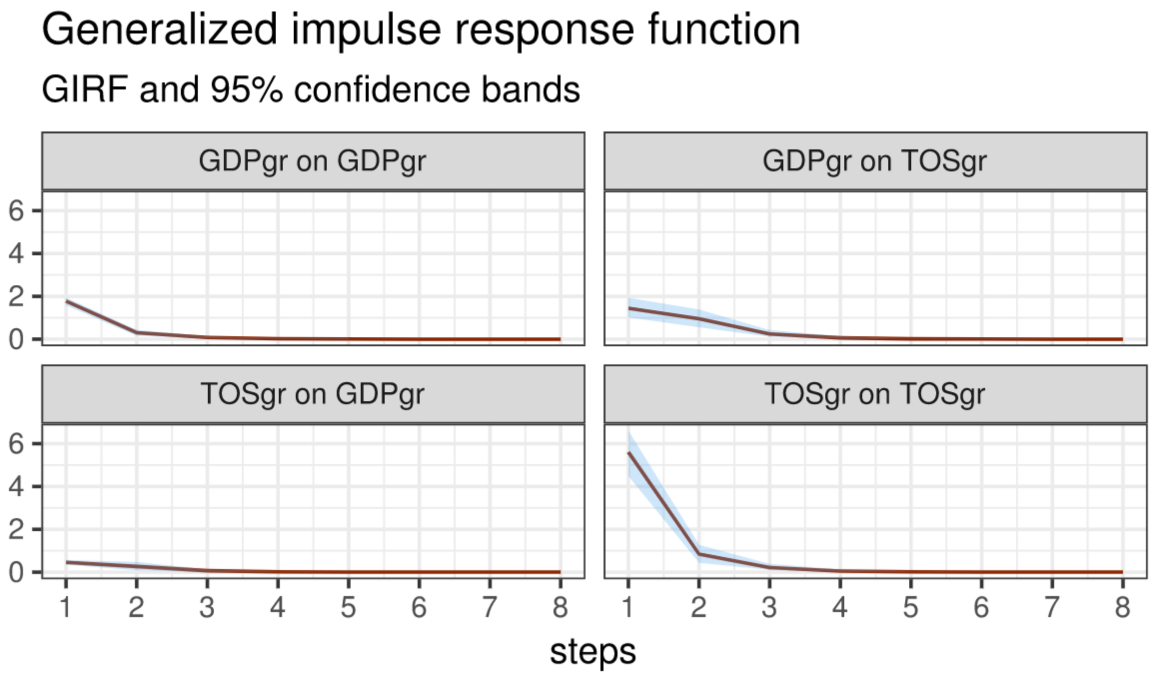

Figure 1. Impulse response functions with 95% bootstrapped confidence bands; the vertical axis shows the magnitude of the response (in percentage) to a one-time positive shock.

[3]As we have said, we have also performed a PVAR regression using two lags. We point out to the reader that the results we have obtained are strongly consistent with those of Table 2. The only slight difference we have found is related to the greater magnitude of the estimated value of α_{12}; actually, with two lags, the two-step GMM estimate is $\alpha_{12} = 0.57$, once again with a p-value < 1%. Furthermore, as we have anticipated, we have also performed a PVAR regression replacing the GDP growth rate with the PGDP growth rate. The results we have obtained are almost identical to those reported in Table 2, and the explanation for these outcomes, as we have already said, lies in the very small value of the population growth rate over the period under examination. For instance, the GMM two-step parameter estimations of $\alpha_{11}, \alpha_{12}, \alpha_{21}, \alpha_{22}$, using the PGDP growth rate, are respectively given by 0.112*, 0.426 ****, 0.037, 0.197****, where the asterisks have the same meaning as in Table 2.

From Figure 1 (see the upper-right box) we can see the response function for TOSgr responding to a one-time (one standard deviation) positive shock on GDPgr. After an initial significant increase in TOSgr value, the response function curves shifts downward and the shock was "reabsorbed" very slowly in about 4 years. On the contrary, a one-time shock on TOSgr (see the lower-left box) caused a very small, almost negligible, initial increase in GDPgr and was reabsorbed in about 3 years. The remaining two boxes confirm the autoregressive structure of both GDGgr and TOSgr. These findings are in line with the PVAR analysis of the previous section and confirm the relevance of the impact of GDP changes on TOS.

6. Employment-GDP relationship

As we have shown in the previous section, the PVAR analysis for the entire panel confirms that tourism growth in Italy depends on the past value of the economic growth rate (EDTG hypothesis), even if we have also found a weak dependence of economic growth on tourism development. It may be interesting to further extend our analysis, taking explicitly into account the implications of these findings on the labor market, with particular regard to the employment levels.

In this section, we will show how to use the estimation of the elasticity of employment to GDP, also known as the employment intensity of growth, $\frac{\Delta EMPL}{\Delta GDP}\frac{GDP}{EMPL}\%$, to investigate the effect of GDP on employment level EMPL for the whole economy. Furthermore, we will extend our analysis at the sectoral level, taking explicitly into account the relation between the employment growth rates in EMPL_COMM, EMPL_IND and EMPL_SERV sectors (which we have defined above in Section 3).

We proceed with a preliminary analysis of the order of integration of the log of the variables of interest, i.e., *ln(GDP)*, *ln(EMPL)*, *ln(EMPL_COMM)*, *ln(EMPL_IND)*, and *ln(EMPL_SERV)*.

Given the presence of cross-sectional dependence (CSD), which is common with this kind of model, in order to check the integration order of our series, we have relied on the so called "second generations tests", which are robust against CSD, the Breitung test and the Pesaran cross-sectionally augmented Dickey-Fuller ADF statistics (CADF)[4] (see Breitung and Das, 2005 and Pesaran, 2003). In Table 3, for the sake of brevity, we report only the main results of the former test; however, we point out to the reader that the CADF test gives identical outcomes.

Table 3. Breitung unit root test-H_0; the panels contain unit roots.

Variable	*Lambda*	*p-value*	*Integration order*
Ln (GDP)	−0.0530	0.4789	I(1)
ΔLn (GDP)	−3.0686	0.0011	I(0)
Ln (EMPL)	1.1644	0.8779	I(1)
ΔLn (EMPL)	−5.1870	0.0000	I(0)
Ln (EMPL_COMM)	0.3745	0.6460	I(1)
ΔLn (EMPL_COMM)	−7.4979	0.0000	I(0)
Ln (EMPL_IND)	0.5689	0.7153	I(1)
ΔLn (EMPL_IND)	−7.9897	0.0000	I(0)
Ln (EMPL_SERV)	2.3464	0.9905	I(1)
ΔLn (EMPL_SERV)	−6.7832	0.0000	I(0)

[4] We have employed the Stata packages *xtunitroot* and *pescadf*.

As is evident from Table 3, all of our variables are integrated on an order of 1 (the log differences being stationary). At this point, instead of getting the short-run estimates by simply regressing *Δln(EMPL)* on *Δln(GDP)*, it may be interesting to verify the presence of a *long-run* relationship between *ln(EMPL)* and $ln(GDP_t)$ by performing a cointegration test between the two series. In light of the already mentioned strong CSD detected, we relied on the second-generation Westerlund cointegration test, which is robust against CSD[5]. Table 4 sums up the main findings of our analysis.

Table 4. Westerlund cointegration test.

Variables: Ln (EMPL), Ln (GDP) – H_0: no cointegation			
Statistic	Value	Z-value	P-value
Gt	−1.601	−2.687	0.004
Ga	−6.006	−2.167	0.015
Pt	−5.664	−2.897	0.002
Pa	−3.359	−3.063	0.000

Since, as is evident from Table 4, *ln(EMPL)* and $ln(GDP_t)$ are cointegrated at an order of 1, we can simply estimate the following equation (see, for instance, Crivelli et al., 2012):

$$ln(EMPLt) = \alpha + \beta Ln(GDPt) + \varepsilon t \quad (2)$$

Given the above-mentioned presence of CSD, we estimated Equation (2) by employing the estimated generalized least squares (EGLS) technique with fixed effects and a cross-sectional seemingly unrelated regression SUR (see Zellner, 1962) even if, for the robustness check, we have also performed an alternative estimate using the *xtscc* Stata package, which produces regression estimates with Driscoll-Kraay standard errors (see Hoechle, 2007); both estimators are well suited for panels characterized by CSD, heteroskedasticity and autocorrelation[6].

Table 5. EGLS (cross-sectional SUR).

Ln (EMPL)	Coef.	Std. Err	t	P>|t|	95% CI	
					Low	High
Ln (GDP)	0.579771	0.003260	177.8535	0.000	0.573	0.586
const	−0.352269	0.034924	−10.0867	0.000	−0.420	−0.283
Weighted Statistics						
R-squared		0.999	Prob(F-statistic)		0.000	
Adj R-squared		0.999	Durbin-Watson		2.047	
S.E. of regression		1.024	Pesaran CD test		0.991	
F-statistic		1080919				

We can get more information about the stability of the long-run relationship between *ln(EMPL)* and *ln(GDP)* by performing a dynamic analysis of an autoregressive distributed lag model (ARDL),

[5]For the robustness check, we also performed the alternative Pedroni cointegration test, and the results are strongly consistent with those presented in Table 4.

[6]We point out to the reader that the results obtained with the two estimators are almost identical. In particular, the estimated β value using the *xtscc* package was equal to 0.581, with a p-value ≈ 0.

reparameterized into error correction model (ECM) representation. In our case, a general *ARDL(p, q)* model can be written as follows:

$$ln(EMPL_t) = \mu + \sum_{j=1}^{p} a_j ln\left(EMPL_{t-j}\right) + \sum_{J=0}^{q} b_j ln\left(GDP_{t-j}\right) + \varepsilon_t \qquad (3)$$

with the corresponding ECM representation given by the following reparameterization:

$$\Delta ln(EMPL_{it}) = \mu + \sum_{j=1}^{p-1} \alpha_j \Delta ln\left(EMPL_{t-j}\right) + \sum_{i=0}^{q-1} \beta_j \Delta ln(GDP_{it-i})$$
$$+\pi[ln(EMPL_{t-1}) + \gamma Ln(GDP_{it-1})] + \varepsilon_{it} \qquad (4)$$

where $\pi = -(1 - \sum_{j=1}^{p} a_j)$, and $\gamma = -\left(\sum_{j=0}^{q} \beta_j\right)/\pi$.

As to the choice of the optimal lag length, the comparison of the AIC, SC and HQ criteria suggest to choose an *ARDL(4,1)* model.

Our ECM is then described by the following equation:

$$ln(EMPL_t) = \mu + \sum_{j=1}^{4} a_j ln\left(EMPL_{t-j}\right) + b_0 ln(GDP_t) + b_1 ln(GDP_{t-1}) + \varepsilon_{it} \qquad (5)$$

which admits the following ECM representation:

$$\Delta ln(EMPL_{it}) = \sum_{J=1}^{3} \alpha_j \Delta ln\left(EMPL_{t-j}\right) + \beta_0 \Delta ln(GDP_t)$$
$$+\pi[ln(EMPL_{t-1}) + \gamma Ln(GDP_{it-1})] + \varepsilon_{it} \qquad (6)$$

where π is the adjustment (feedback) parameter speed and γ represents the long-run estimate of the elasticity of the employment to GDP.

In order to estimate Equation (5) (or Equation (6)) we have relied on the cross-sectional augmented ARDL estimator (CS-ARDL) which, once again, is robust againsts the presence of CSD[7]. The following table sums up the main findings of our analysis.

As is evident from Table 5 and Table 6, the estimated value of the long-run employment intensity of growth was about 0.55%, implying that an increase of 1.8% of real GDP leads to an increase of about 1% in employment level. It should be noted that this result is consistent with the one found by ECB (2016), for the period ranging 1999–2016, and it is not very far from the estimated values found for other countries (see, for instance, Padalino and Vivarelli, 1997, for the USA economy, and Boltho and Glyin, 1995, for a set of OECD—Organization for Economic Co-operation and Development member countries). As to the error correction coefficient π, it has the expected (negative) sign and a value between -1 and 0, implying a stable adjustment mechanism, even if its small magnitude indicates a slow adjustment speed to the long-run equilibrium.

[7]We used the Stata package *xtdcce2*: see Dizten (2018).

Table 6. (Dynamic) Common correlated effects estimator-(CS-ARDL).

ΔLn(EMPL)	Coefficient	Std. Errors	z	P>|z|
Ln ($EMPL_{t-1}$)	0.8977	0.0889	10.10	0.000
Ln ($EMPL_{t-2}$)	−0.2893	0.1159	−2.49	0.013
Ln ($EMPL_{t-3}$)	0.1911	0.0866	2.20	0.027
Ln ($EMPL_{t-4}$)	−0.026	0.0600	−0.43	0.664
Ln (GDP)	0.3071	0.0810	3.79	0.000
Ln (GDP_{t-1})	0.1154	0.0444	2.60	0.019
π	−0.2264	0.0633	−3.58	0.000
γ	0.5478	0.0048	112.67	0.000
F (200, 140)	2.18e+06		R-squared (MG)	0.89
Prob > F	0.000		Pesaran CD test	0.8708

As we have said, we have further extended the analysis in order to capture the effects of GDP variations on the employment level in those sectors more related to tourism activities. Accordingly, the model that we have estimated is the following one:

$$\Delta ln(EMPL\_COMM_t) = \alpha + \beta_1 \Delta ln(GDP_t) + \beta_2 \Delta ln(EMPL\_SERV_t) + \beta_3 \Delta ln(EMPL\_IND_t) + \varepsilon_t \quad (7)$$

Table 7. EGLS (cross-section SUR).

ΔLn (EMPL_COMM)	Coef.	Std. Err	t	P>|t|	95% CI	
					Low	High
ΔLn (GDP)	0.6418	0.0152	41.99	0.000	0.6022	0.6813
ΔLn(EMPL_SER)	−0.4472	0.009	−48.498	0.000	−0.4711	−0.4233
ΔLn(EMPL_IND)	−0.1526	0.0104	−14.590	0.000	−0.1797	−0.338
const	0.0044	0.0003	13.224	0.000	0.003	0.1255
Weighted Statistics						
R-squared		0.9033	Prob(F-statistic)		0.000	
Adj R-squared		0.8980	Durbin-Watson		2.16	
S.E. of regression		1.026	Pesaran CD test		0.999	
F-statistic		168.6806				

The two relevant results of this last regression (see Table 7) are represented by a) the value of β_1, which is not so far from the estimated value of the elasticity of total employment to GDP, and b) the negative signs of β_2 and β_3, which are respectively the parameters that capture the relationship between employment in service (EMPL_SERV) and non-service sectors (EMPL_IND) with that in the commerce, accommodation and food services sector (EMPL_COMM). The first finding may be simply explained by considering that the ratio of commerce, accommodation, and food services employment to total employment in the period under consideration has been characterized by small oscillations around 0.18%, after which point it has been almost stable. The second result, i.e., that a variation of 1 point in the growth rate of EMPL_IND or in the growth rate of EMPL_SERV would cause, respectively, a variation in the opposite direction of 0.15 and of 0.44 points in the growth rate of EMPL_COMM, is very interesting since it highlights at least two important related aspects of the

Italian labor market First, the progressive tertiarization of the Italian economy; secondly, a possible phenomenon of re-employment of workers—forced out of the primary and secondary sectors and in the tertiary sector (with particular regard to those economic activities more related to tourism services).

7. Discussion and conclusions

The analysis we have performed so far suggests that economic growth is the key element to fostering the Italian tourism industry, while tourism does not have a relevant impact on the Italian economic growth.

These results are in line with a part of the literature that focus on Italian data. For example, Massidda and Mattana (2012) for the long run, Shahbaz et al. (2017) and Dogru and Bulut (2018) confirmed a weak feedback hypothesis for inbound tourism in Italy. Of course, every comparison one tries to do with previous works focused on Italian data should consider that most of them analyzed international tourism. Furthermore, the causality linkages between economic growth and tourism development are not stable over time, mainly due to structural changes in the time series (e.g., Antonakakis et al., 2015; Shahbaz et al., 2017). If we consider the relevant effect of PGDP growth on TOS growth jointly with the small opposite effect, we should be more likely to confirm an EDTG hypothesis, which was also found for Italy (once again for inbound tourism) by Aslan (2013), and, for the short run, also by Massidda and Mattana (2012). Furthermore, the results obtained at the sub-national level do not provide information about the relationship between economic growth and tourism that is easy to compare to our results. For example, Centinaio et al. (2022) neither confirmed the TLEG nor EDTG hypothesis for many of the largest and richest Italian provinces, justifying this result with the decreasing marginal contribution of tourism to economic growth over a certain threshold of development. In addition, they confirmed the existence of a univocal or bi-univocal relationship between tourism and economic growth only in 35 out of 107 Italian provinces. Therefore, it is quite evident that sub-national data may provide a more detailed framework, but there is a need for more extended time series. Nevertheless, their analysis has the value of being a starting point for future research.

About the interpretation of our results, the first partial explanation of the impact of GDP on TOS may be based on a dynamical version of the Keynesian theory of consumption demand. Since we considered both domestic and foreign demand for tourism services, the positive relationship we have found between $GDPgr_{t-1}$ and $TOSgr_t$ could simply indicate that an increase in the past value of GDP causes an increase in current domestic consumption, and also in current domestic demand for tourism services. Furthermore, as far as the inbound tourism is concerned, the positive effect of GDP growth on the growth of foreign tourists may be explained, as has been pointed out, by the fact that "the development of a country is due to good economic policies and governmental investments in both fixed and human capitals. They create a trustworthy climate and culture which encourage the foreign tourist arrivals" (Chirilă et al., 2020).

However, the point of interest is that, as we have seen, the increase in both domestic and foreign tourist demand is not sufficient to cause an opposite effective multiplicative effect, i.e., from $TOSgr_{t-1}$ to $GDPgr_t$, in light of the small estimated value of α_{21}, which, moreover, according to the two-step GMM estimator, would not be significant even at the 10% significance level (see Table 2 above).

The analysis of the employment-GDP relationship has confirmed the impact of economic growth on tourism development previously highlighted by the Granger causality and PVAR analysis. Our results show that economic growth stimulates an increase in the commerce, accommodation and food services sector's employment rate that is in line with the employment intensity of growth for the whole economy. Furthermore, the negative relationship between the employed in the primary and secondary sectors and those in the sector most representative of tourism (commerce, accommodation and food services) confirms the tendency of the tourism sector to attract a workforce that the primary and secondary sectors are not able to absorb. This latter result makes sense in consideration of the economy's tertiarization process and the tourism sector's development related to economic growth.

What our analysis seems to suggest is that the tourism sector in Italy is not strong enough to have an effective impact on economic growth. Indirectly, we can also find corroboration of our results by looking at the tourism sector's share of GDP. According to the United Nations World Tourism Organization (UNWTO) data, Italy is the third most visited European tourist destination after France and Spain; however, the tourism sector's contribution to the Italian GDP was around 6% in 2018, while it was around 7% and 12%, respectively, for France and Spain.

We maintain that these findings are strongly consistent with the dynamic evolution of the Italian economy. In a country that, in the last 20 years, has experienced a long recessionary phase, jumping from one economic crisis to another, one cannot think to boost economic growth by simply relying on tourism sector expansion or by simply counting on the fact that the employment in tourism sector may replace the job losses in the primary and secondary economic sectors. In the presence of path dependence (Arthur, 1994), the effects of such a long recession, i.e., in terms of the deterioration of human capital, a decrease in labor productivity and the related loss of competitiveness, an increase in the unemployment rate (about 10% in 2019), etc., require stronger policies that may reverse the economic course of the country.

Here, we come to the opportunity offered by the Next-Generation EU program, which is a recovery plan agreed upon by the European Council to support European countries hit by the COVID-19 pandemic, which allocated about 205 billion euros to Italy to be spent over the period of 2021–2026 (see Italian Government, 2021).

If the Italian federal economic policies were to hit the target of increasing GDP—for instance, by increasing labor productivity through the promotion of enterprise innovations and human capital accumulation, one would expect to find the following in the coming years: from one side, an increase in the employment rate in both primary, secondary and tertiary sectors (i.e., reversing the negative sign of $\frac{\Delta EMPL_{COMM}}{\Delta EMPL_{IND}}\frac{EMPL_{IND}}{EMPL_{COMM}}\%$), and, on the other side, a bidirectional causality between GDP and TOS, meaning that tourism has become a leading sector in Italy. After all, the significant estimated magnitude of the (average) employment intensity of growth, which we have found in the previous section above, indicates that there is room for a stronger increase in the employment rate.

Conflict of interest

All authors declare no conflict of interest regarding this study.

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