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Tourism Development and Economic Growth: The Validity of the Tourism-Led Growth Hypothesis for Madeira

Desenvolvimento do Turismo e Crescimento Económico: A Validade da Hipótese do Crescimento Liderado pelo Turismo para a Madeira

António Almeida
antonioa@staff.uma.pt
Faculdade Ciências Sociais – Universidade da Madeira

Abstract

Most island´s economies, such as Madeira, are confined to maximizing opportunities in the sectors not constrained by market proximity, as in the case of tourism. Previous empirical studies have mainly applied econometric models to find and characterize the relationship between tourism development and real GDP in the long run. While a few studies fail to corroborate this relationship due to its complex nature, most studies confirm the Tourism-Led Growth Hypothesis (TLGH) that links the economic growth on islands to further development in the tourism sector. This paper explores the validity of the tourism-led growth hypothesis for Madeira using annual data from 1978 to 2019. The results of the cointegration tests point to a positive long-run relationship between tourism receipts and economic growth. Moreover, the analysis of the short-run dynamics, based on a VECM reveal that this long-run linear relationship is stable. However, we need to the taking into account the existence of structural breaks, and a change of regime, and therefore sources of instability. From a "causality" point of view, the main finding suggests that there is long-run causality running from tourism to GDP but not the opposite. The overall results seem to corroborate the widespread view of the region´s over-dependence on the tourism sector

*Keywords***:** Causality; Cointegration; Economic Development; Madeira Island; Tourism development

JEL Codes: L83; R11; B23

Resumo

A grande maioria das economias insulares, tais como a Madeira, estão limitadas à maximização das oportunidades de desenvolvimento em setores não dependentes do factor distância, como no caso do turismo. Constata-se na literatura uma série de estudos empíricos de cariz econométrico centrados na identificação e caracterização da relação turismo-PIB. Embora um número finito de estudos falhe em reportar a existência de uma relação estatisticamente significativa, a maioria dos estudos confirma o que se designa por Tourism-Led Growth Hypothesis (TLGH), hipótese que estabelece o setor do turismo como fator dinamizador do crescimento do PIB. Este estudo analisa a validade da TLGH para o caso da Madeira, no período de 1978 a 2019. Os resultados do teste de cointegração confirmam uma relação de longo-prazo entre o desenvolvimento turístico e económico da região, conclusão que se estende à relação de curto prazo com base numa abordagem Vector

Error Correction Model (VECM). Dada a necessidade de ter em conta a existência de quebras estruturais, aplicam-se testes apropriados. Do ponto de vista da causalidade, a conclusão principal remete para a identificação da linha de causalidade turismo->PIB. Os resultados parecem sustentar a perceção genérica relativamente à sobre dependência da região do setor do turismo.

Palavras-Chave: Causalidade; Cointegração; Região Autónoma da Madeira; Desenvolvimento Turístico;

Códigos JEL: L83; R11; B23

1. INTRODUCTION

Islands conjure up attributes such as remoteness, a slower pace of life, distinct cultures and pristine environments in the public imagination: features that have been attracting tourists for centuries (Butler, 1997; Kokkranikal et al., 2003). Butler (1997, 59), indeed, ascribes the island-tourism phenomenon as resulting from their image of "escapism, exclusivity or adventure". The reality of life on tourism islands is, however, much different to the paradisiacal, affluent and laid-back image that is created by the tourism industry, and embedded in popular Western culture, to sell those places as tourist destination. Wood (2000, 362), for example, argues that the cruise industry in the Caribbean has created "carefully planned and artificially created environments" in order to avoid "spontaneous contact and experience" with reality, which would undoubtedly be shocking (Wood, 2000, 362). Indeed, most theoretical-empirical analyses that have been set in the island context (Balcilar et al., 2017), have tended to highlight a range of difficulties that shape their economic and social development (Barnett, 2001). Recent studies have also revealed that the economic and social circumstances of islands are increasingly vulnerable to the threat of climate change (Wood, 2000; Read, 2004; Balcilar et al., 2017; Hampton & Jeyacheya, 2020). The crucial challenge for islands struggling address problems of underdevelopment and poverty is that there tend to be few viable economic alternatives, other than tourism, which seems to be the only sector that has any kind of comparative advantage (Murray, 2001).

Under such circumstances, the temptation to exploit the natural strategic resources (climate/localization, geo-strategic importance in the international forums) is irresistible. Local politicians have, indeed, every reason to believe that further tourism development is likely to be a successful and safe medium-term investment, and thus a sensible electoral strategy, despite the increasingly challenges of launching new market niches in the already-crowded tourism marketplace. The tourism sector is one of the few viable sectors in most small island developing states (SIDS). Sharpley (2003, 246) asserts that "in an island context, reliance upon tourism as a means of development is almost universal". (For a more recent analysis of the subject, see Balcilar et al., 2017, and Hampton and Jeyacheya, 2020; see also Carey, 1989; Briedehann & Wickens, 2004; Vanegas & Croes, 2003; Cánoves et al., 2004). Development opportunities in most SIDS are, indeed, confined to maximizing opportunities in those sectors that are, like tourism, not constrained by market proximity. Not surprisingly, many islands continue to try to incorporate ever more markets, natural resources, labour force and attributes that allow them to commoditize their cultural, geographical, and climatic features to attract increasing numbers of tourists. They do not, however, always succeed in this, as this requires increasingly more marginal resources to be added to the mix.

The vital role of tourism for employment and growth perspectives on islands has been extensively researched in previous studies (Bertram, 2004; Balcilaret al, 2017; Roudi et al., 2019; Hampton & Jeyacheya, 2020). Based on the trade-economic growth relationship theory, Balaguer and Cantavella-Jordá (2002) put forward the tourism-led growth hypothesis (TLGH), under which a central role is given to the tourism sector as an engine of growth, grounded on the information available about the impact of tourism development on a myriad of sectors in Spain. This study examines the role of the tourism sector in the economic dynamics of Madeira. It does so by testing the TLGH for Madeira with the aim of attempting to confirm (or disconfirm) the TLGH in the Madeiran context. Contrary to the widespread belief that the tourism sector is perfectly compatible with the ongoing attempt to completely overhaul the whole economic strategy of reaching higher levels of GDP per capita, the findings of this study suggest quite the opposite.

This paper considers a relatively expanded time window, as the study of relationship between tourism development and economic growth in Madeira focuses on the variable's tourism receipts and GDP for the 1978-2019 period. This allows the evaluation of both the effects of the European Union (EU) adhesion and several other economic shocks on the economic record of the island. The tourism sector was hardly hit by the 2010 natural disaster but favoured by the massive rounds of public investment following the completion of the EU adhesion process. The analysis can therefore be expected to be able to capture the impact of the current challenges and past experiences of the tourism sector.

This study provides a basis for policymakers, private investors, operators and institutions, and individuals to understand how significantly the tourism impacts economic growth. The empirical results, although indicative, can provide inestimable insights into the tourism earnings-economic growth nexus policy decision making. It also offers useful knowledge to inform the current debate of the regional development strategy.

The paper is organized as follows. The next section describes the recent development in Madeira, from an economic point of view. Section 3 provides a brief overview of the TLHG literature. Section 4 describes the data and empirical methodology and presents the empirical results. The discussion of the results and the concluding remarks are in the last section.

2. CONTEXTUAL SETTING

Madeira is an archipelago, with an autonomic political-administrative status entrenched in the Portuguese constitution, with 254876 inhabitants, inhabitants (according to data published by the Regional Directorate of Statistics of Madeira), located in the North Atlantic Ocean, about 1000 km away from Lisbon (DREM, 2023). Located between the Azores and the Canary Islands, the archipelago shares several common points with its neighbours, and other small islands economies in general. Its economy is largely centred on the tourism industry and in the public administration sector. The regional economic activities are mainly based in the tertiary sector, that account for around 84.4% of the regional Gross Value Added (GVA). The secondary sector contributes with 13.3% of the GVA followed by the primary sector (2.3%) (DREM, 2023).

The local economy faces several problems and challenges. For example, the island suffers from a relatively high unemployment rate among the young people and, in a recent past, from a higher rate of high school student's dropout. The manufacturing companies are in general not competitive abroad. Madeira has pursued a non-orthodox development strategy based on an "advanced financial services/offshore financial centre", focused on the idea of a free trade area offering companies a special status and fiscal privileges. Despite its geographical location the regions have succeeded in keeping rural characteristics in a large part of its territory, thanks to the establishment of a protected natural area. Undoubtedly, the region has witnessed an impressive economic growth over the last years, although the prospects for the current year (2023) and the following ones seem much less optimistic.

The importance of tourism for the local economy in terms of employment, value added and exports is undisputable, particularly since it widely considered to be the only sector that is genuinely internationally competitive (Ferreira, 2000; Comissão Europeia, 2022; Majdak & Almeida, 2022). The economy's dependence on important tends, even so, to limit the size of the multiplier effects associated with tourism. This said, tourism is the only sector where it may be possible to achieve significant "clusterization" due to its close links to the transport, agriculture and the entertainment sectors. As previously noted, tourism is an important sector in the region's economy because it contributes 20% to the region's value added (according to Madeira Statistical Office's "Tourism Satellite Accounts" available for 2015 and 2019), implying that it is a vital market for the service sector and local products. The available data on gross value added by sector suggests a figure of 15.9%. The local tourism plan projected a total of 40,000 hotel beds by 2027, up from 29,000 in 2006. The aim now is to reduce the concentration of hotels around the Funchal area, where the industry began in the 1890s, with hotel companies being encouraged to invest in the west and north coasts. The regional government has adopted a high-quality strategy of supplying differentiated products to new, niche market segments. This strategy is predicated on the understanding that Madeira cannot realistically become a mass-tourism destination like the Canary Islands, as this would risk major damage to the island's natural heritage. The number of hotel beds on the island has grown even so. There is

good reason to expect that the projection of 40,000 beds will be reached due to the increasing number of 'local lodgment' properties that have been established over the last decade.

In view of the considerable significance of the sector, the development of niche markets based on 'soft' or 'postmodern' approaches (such as "ecotourism") has been recommended by some experts (Ball, 1996; Briedehann & Wickens, 2004). The premise is that attention must be refocused on up-market tourism segments, which would allow local authorities to adopt approaches based on higher-spending tourists and a slower rate of economic growth. Many would argue, however, that there are in reality very few realistic alternatives to mass tourism in most island economies. Hospers (2002), for example, examined the potential impact of postmodern tourism approaches in Sardinia and concluded that there was little potential for such alternative forms of tourism to fully replace mass tourism, even if they were based on small but high-spending market segments. Gabbay and Ghosh (2003) argue that a scale effect is needed to fully mobilize local resources and achieve measurable impacts by way of incomes and employment, which is simply not achievable in many island contexts due to the lack of market potential. This can severely hamper the prospects of the tourism industry to achieve the necessary scale to operate in international markets. Hospers (2002) therefore suggests that new forms of tourism such as ecotourism may only be able to play a complementary or additional role. As such, it can be argued that only those types of tourism that generate significant employment can truly serve to address the regional development problem.

This is not to suggest that the tourism sector in Madeira has not been an effective "growth pole", in spite of its dependence on external markers and global tour operators. Many SIDS have a high human development index in spite of the dependence of their tourism sector on the global tour operators to direct tourists their way. This is a condition that is widely understood in the literature to retard or even prevent true development. Sharpley (2003), for example, ascribes the transformation of Cyprus into a relatively wealthy, modern state to mass tourism, arguing that tourism revenues contributed decisively to GDP, to the stimulation of other sectors and to the revitalization and regeneration of traditional services. In most islands, tourism is a major source of employment, helping the country to maintain full employment, assisting in the entry of women into the labor market, and, thereby, boosting the social/cultural development of their peripheral areas. In view of the overall positive impacts of tourism, Sharpley (2003) suggests that alternative development programmes emphasizing specialist, niche markets may be desirable. According to Sharpley (2003, 261) luxury tourism approaches are not viable "given the multiplicity of the offer of upmarket destinations, that offer vastly superior products".

Most variables in Madeira experienced growth for most of the years (Martins, 2021; Almeida et al, 2021; Majdak & Almeida, 2022; Comissão Europeia, 2022). Table 1 provides a compilation of variables related to tourism in Madeira. The compound annual growth rate (CAGR) ranges from 0.88% in relation to the average stay to 4.46% in terms of the number of guests. The Gross Domestic

Product (GDP) grown at an annual rate almost identical to the figure computed for the variable "Guests". Not surprisingly, a high level of correlation between most tourism-related variables is recorded in Table 2. The GDP series (at constant prices) exhibits a high degree of correlation with almost all variables, except the variable Revenue per Available Room (RevPar) It is worth to mention that the variable RevPar has one of the lowest growth rates in the 1978-2019 period and displays a distinct pattern in terms of the number of years with negative growth. However, the variable RevPar exhibits a high degree of correlation with the variables Total Revenue and Revenue per accommodation.

Figure 1 plots the figures of the gross domestic product per head (GDPpc) at 2020 constant prices. Madeira has made most progress, between 1992 and 2008; in this period the GDPpc almost doubled (1,88). The impact of the decreasing levels of EU funds and the aftermath of the 2010 natural disaster are well-evident in noticeable regression in the GDPpc between 2009 and 2012 (the data showed a loss close to 16,26% in 2012). The negative impact of such event was only overcome in 2018. The figures also show that the economy was in 2019 7.99% per cent ahead of its pre 2010 crisis (2009). While the GDPpc growth at a constant growth rate of of 5.88% between 1976 and 2010, the growth dynamics was reduced to a growth rate of 0.92% per year, for the 2010-2019 period. Madeira has reduced its distance from the EU-27 average (by 13 percentage points), between 1995 and 2005; then the distance was increased by 8.5 percentage points between 2005 and 2019, as show in Figure 2.

Table 1.: evolution of the main variables in the 1976-2019 period

	1978	2019	CAGR	Uni	(+)	(-)
GDP (constant prices 2019)	845.27	5069,44	4.47%	10^6		
Deflactor (based on the inflation rate)	6,53	100.00	6.88%	…		
Guests	265582	1590882	4.46%	uni.	30	11
Overnigths	1947611	8123309	3.54%	uni.	28	13
Establishments	90	391	3.64%	uni.	29	9
Rooms	5487	16813	2.77%	uni.	33	8
Accommodation capacity	11314	35754	2.85%	uni.	34	7
Personnel employed	4362	7223	1.24%	uni.	24	17
Total revenue	115231	407457	3.13%	10^3	27	14
Revenue from accommodation	59024	267450	3.75%	10^3	26	15
Staff costs	44092	119987	2.47%	10^3	30	11
RevPAR	29	44	1.00%	€	24	17
Average stay	7.33	5.11	-0.88%	Nigths	10	31
Bed occupancy rate	52.5	58.04	0.25%		24	17

Source: Own´s calculations based on data provided by the Madeira Statistical Office (DREM)

Table 2: Correlation degree: key variables

	RP	H	D	E	Q	CA	Ps	Pt	Pa	cp	PIB
RP	1										
Sig.											
G.	0,241	1									
Sig.	0,125										
D.	0,262	,998**	1								
Sig.	0,093	0,000									
E.	0,068	,970**	,960**	1							
Sig.	0,667	0,000	0,000								
Q.	0,059	,964**	,958**	,985**	1						
Sig.	0,711	0,000	0,000	0,000							
CA	0,069	,970**	,964**	,987**	,999**	1					
Sig.	0,663	0,000	0,000	0,000	0,000						
PS	0,180	,890**	,887**	,910**	,931**	,927**	1				
Sig.	0,255	0,000	0,000	0,000	0,000	0,000					
PT	,360*	,985**	,986**	,942**	,940**	,945**	,921**	1			
Sig.	0,019	0,000	0,000	0,000	0,000	0,000	0,000				
PA	,392*	,978**	,981**	,930**	,929**	,935**	,915**	,998**	1		
Sig.	0,010	0,000	0,000	0,000	0,000	0,000	0,000	0,000			
CP	0,186	,898**	,891**	,920**	,947**	,941**	,983**	,923**	,916**	1	
Sig.	0,239	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000		
PIB	0,149	,930**	,921**	,948**	,970**	,966**	,928**	,926**	,917**	,970**	1
Sig.	0,346	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	

Legend: RP. Revpar constant prices 2019; H-Guests; O-Overnigths; E-Establishments; R-Rooms; AC-Accommodation capacity; PE-Personnel Employed; TR-Total Revenue; RA-Revenue per Accommodation; SC-Staff Costs; GDP: GDP constant prices 2019

Source: Own calculations based on data provided by the Statistical Office (DREM; 2023)

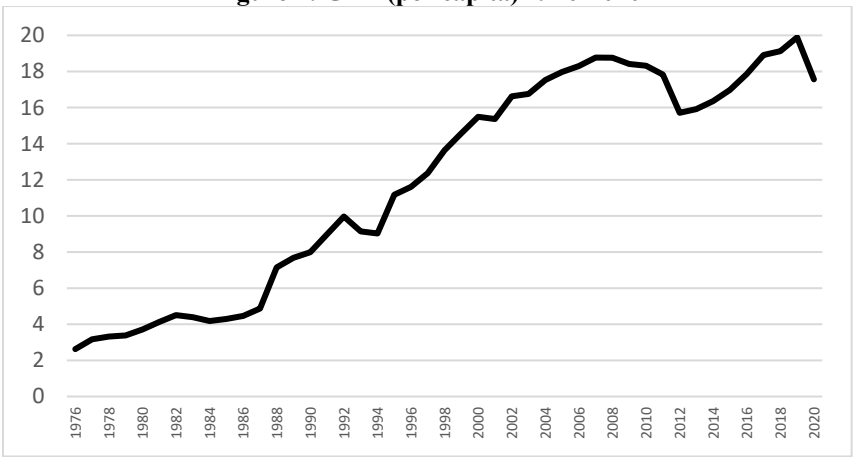
The regional GDPpc reached the national average in 2005, remaining close to the national average between 2005 and 2011. Then, the local economy proxied by the GDPpc experienced an appreciable decline over the last years, with a loss of 3.2 percentage points between 2011 and 2019 (around 9.7 percentage points between 2011 and 2020). The evidence suggests that the Portuguese NUTS2 regions more dependent on the tourism sector (proxied by the ratio GVA Tourism/ Total GVA) reported huge losses in terms of the GDP (at current prices), which is especially true for Algarve and Madeira (See Table 3).

Table 3: GDP losses and dependence on tourism

	Portugal	Continente	Norte	Centro	Lisboa	Alentejo	Algarve	RAA	RAM
ΔGDP 2020/2019	-6.66%	-6.50%	-5.03%	-4.05%	-7.76%	-6.96%	-14.98%	-7.47%	-12.97%
Share Tourism	6.11%	5.89%	4.31%	4.76%	5.44%	5.60%	23.87%	7.88%	13.63%

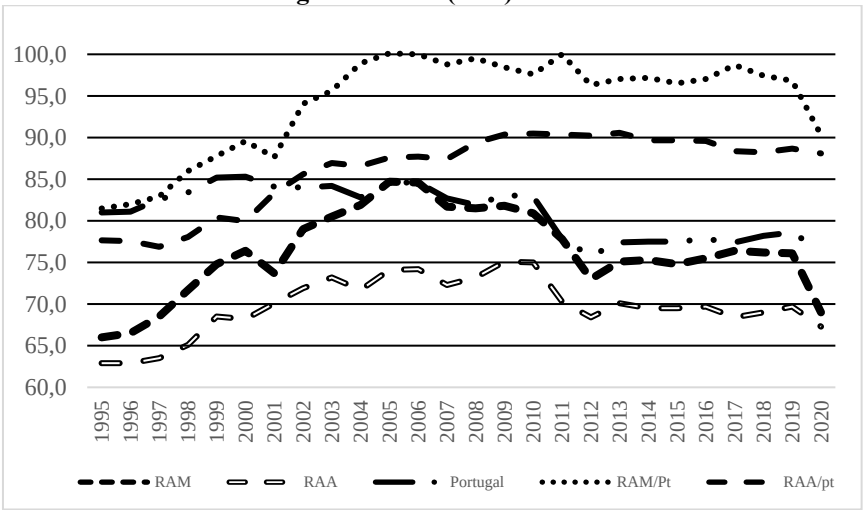
Box 1 summarizes a few key features of Madeira.

Figure 1: GDP (per capita) 1976-2010



Source: Madeira´s Statistical Office;

Figure 2: GDP (PPP) EU-27



Source: Madeira´s Statistical Office; Legend: RAA- Autonomous Regio of Azores; RAM-Autonomous Region of Azores;

Box 1: Madeira

A few insights about the Madeira´s economy and geographical context based on data available at DREM (2023). Madeira is an archipelago, located in the North Atlantic, with an area of 802 km^2. The archipelago is rich in biodiversity (a high number of endemic species) and aesthetical pleasant landscapes but with a challenging mountainous topography and a rugged line of coast, which impacts the economy in a number of ways, such as higher construction costs for infrastructures and for economic activities, namely in the in the agricultural sector, impacted negatively by the limited scope for mechanization and small areas available to cultivation.

The island contains a very mountainous terrain with deep gorges along with valleys and a number of coastal plains locally known as "Fajãs". In total, mountains cover most of the land area, and 72% of the territory is considered a Natural Protected Area. Its main city, Funchal, accounts for almost 41% of the total number of inhabitants of the archipelago. According to the 2021 census, the number of inhabitants was 250769, a slight decrease from the number recorded in 1970 (251135). The region´s population increased by over 9.3% between 2001 and 2011 (a net gain of 22774 inhabitants), fueled by the reintegration of returnees from Venezuela and other traditional places of emigration. The island witnessed again a diminution of 17016 inhabitants between 2011 and 2021as a result of the 2011 local/national crisis through emigration to the United Kingdom and other destinations.

The island has a relatively developed an economy based on the commercial sector, public administration, and tourism. Tourism facilities are mainly located in Funchal and along the southern coast, where road communications are relatively well developed. Madeira emerges as one of Portugal's most successful regions outside the metropolitan areas of Lisboa and Porto. GDP per capita in 2019 stood at 20,2 thousand euros per person

(ranked third in amongst the Portuguese regions). The following figures adds more data and information about Madeira.

.Average annual growth rate of GDP (1995-2019): 2.43%
.Agriculture as a share of Gross Added Value (GVA) (2019): 1.82%
.Agriculture as a share of Total Employment (2019): 13.16%
.Manufacturing as a share of GVA (2019): 11.93%
.Services as a share of GVA (2019): 84.69%
.Participation rate (2018): 62% (men: 68%; women: 57%)
.Unemployment rate (2019): 7.4%
.Educational attainment of population, aged ≥15 years (2018): Less than high school: 64%;
.Educational attainment of population, aged ≥15 years (2018): with a college degree 16%;

Employment growth in Madeira, for the 1995-2019 period, has been mainly due to positive developments in services (a gain of 27,500 jobs over a total net gain of 7,300 jobs. Both the agricultural (loss of 9,900 jobs in the economy as a whole) and industrial sector (loss of 10,3 thousand jobs) have made a significant negative contribution. The region was severely affected by a number of negative developments in terms of the access to EU funds after 2007. The 2007-2013 EU Program led to the exclusion of Madeira from the Convergence Objective, and its inclusion in a transitional regime (Phasing-in) for state aid, characterized by a reduction of 40% in terms of the EU funds available. This reclassification was carried out following the relatively successful economic dynamics translated into a regional GDP level above the 75% (of the EU average GDP) threshold. Simultaneously, the local authorities witness a change of direction in the EU regional development policy, less focused on an infrastructural agenda and more pro-entrepreneurial and R&D in tone. Not surprisingly, employment in that civil construction sector shrunk by 57% between 2019 and its peak in 2004. This has been compensated with a large shift to employment in services, in general, and to the commerce and accommodation and restaurant sub-sectors in particular (an increase in absolute terms of 12,600 jobs) and to the public administration (a net gain of 11,000 jobs).

The crisis in the triad 'tourism-public administration-construction', evident in the aftermath of the 2010 natural disaster, is as a matter of serious concern, as it is widely recognized that such sectors affected the development of the economy at large, as well future opportunities. By 2012, as a result of the application of the Economic and Financial Assistance Program (PAEF) in Portugal, between 2011 and 2014, along with the consequences of the Madeira's unreported debt, it was well evident the incapacity of the public sector in Madeira "to act as a 'stabilizer' due to the constraints on public budget expenditure (budgetary consolidation process in Portugal)" (Ismeri, 2011, 136). As a result of both the 2011 financial crisis in Portugal and the local large hidden government debt, the fiscal and financial situation of the Autonomous Regions has changed for good. More recently, it is also evident that the Madeira Free Zone is a matter for concern. Current negotiations with the Portuguese government and the EU have been quite successful from the point of view of the local authorities.

In all evidence, the public administration (non-market services) as not have been an important source of new jobs, for the 2012-2019 period. Only the tourism sector has been able to generate new jobs in this period (4,500). Of course, the "strong concentration on a single sector (tourism) and consequent exposure to external risks (enforced by the world market)", is a risky business (Ismeri, 2011, 128). In fact, "high dependency upon tourism means a high vulnerability to the erratic and uncertain movements of tourism – influenced by international terrorism, catastrophic events (as the tragedy of 20 February)" (Ismeri, 2011, 128).

In 2011, a report commissioned by the European Commission stated that "there is a wide perception that the growth factors that have supported the model of development over the last 30 years are not valid anymore, due to significant internal and external changes." (Ismeri, 2011, 137). The authors of the report concluded that even if the tourism sector offered from a less positive outlook, and more competition and erratic demand, the sector "will certainly remain a key economic sector". As elsewhere, with a largely narrow economic base, namely in the agricultural and the manufacturing sphere, the local government has little choice but to pursue further development of tourism despite the many fundamental constraints in the locational and environmental areas.

As elsewhere, development in islands must be understood as a "multidimensional process" linked to improvement in multiple indicators, in the social, political, cultural and environmental sphere, such as those ones defined by the 17 Sustainable Development Goals (SDGs). However, the

economic growth dimension is a fundamental prerequisite to the upgrade of all the non-economic factors. As stated by Sharpley (2003, 248), "the pollution of poverty, must first be addressed before development in any form can occur", which requires sufficient economic growth (see also Carlsen, 2003; Singh, 2003). Concerning Madeira, it can be seen that the tourism sector, as a whole, represents approximately 1.7 million tourists per year (data referring to 2017-2019) (DREM, 2023). On the contrary, ecotourism (proxied by the rural tourism segment), more like a degrowth-based approach, represents only 40,000 tourists per year (again, data referring to 2017-2019) (DREM, 2023).

It is important, therefore, that all tour operators should aim to ''achieve commercial success in ways that honour ethical values and respect people, communities, and the natural environment'' (Våland & Heidi, 2005, 495; see also Falcón-García & Medina-Munoz, 1999). In view of the severe environmental constraints faced in most SIDS, it is important that every business operation attempts to minimize its negative impacts on the natural environment. It can be argued, however, that the solution to the environmental problems can be found in upgrading the tourism product and strict obedience to environmental legislation, rather than to focus on an agenda of de-growth. It is possible to argue, moreover, that it is better to focus on well-founded growth paths based on existing capacity, tried-and-trusted growth paths and low-end solutions, rather than to put economic faith entirely in radical high-technology solutions. Attempting to begin again in an unfamiliar field is, it can be argued, unlikely to meet with great success (Maskell, 2001). In the meantime, however, tourism development based on alternative formulations of tourism (such as ecotourism) may allow for some experimentation with innovation and change. The additional employment created in such niche segments may also help to compensate for the inevitable losses in those sectors that have traditionally been protected. The crucial problem with all niche solutions, however, is that it is difficult to achieve any significant scale effect. This limits the probability of success of such approaches. As Cheer et al., (2018, 4) note, "most [islands] do not possess large extractive resource industries or manufacturing sectors meaning that opportunities for economic diversification are considerably constrained. Migration, remittances, foreign aid, and public sector bureaucracy (so-called MIRAB model, an acronym for migration (MI), remittance (R) and foreign aid (A) and the public bureaucracy (B)) have long been backstops for [Pacific Islands Economies] PIC economies, as well as a small number of agricultural exports including copra and sugar. These constraints make PICs vulnerable to geopolitical fluctuations, and the outfall of contestation between major geopolitical powers".

Not surprisingly, as in other places in the Southern Latitudes, a number of socio-economic authors promote enthusiastically "the notion that tourism's potential remains largely underdeveloped" (Cheer et al., 2018, 1). Most would agree genuinely with the notion that tourism is a vehicle for economic development. Madeira have had a long association with the international tourist at the European level based on notions of paradise, mild climate, friendly "welcome" and sub-tropical splendour. However, the research available revealed a dearth of timely and accurate information, in a quantitative, authoritative (i.e., statistically corroborated) and easily interpretable manner, about the effective impacts of the tourism sector on the local economy.

3. THE TLGH HYPOTHESIS

According to Perles-Ribes et al. (2017), the tourism-led growth hypothesis (TLGH) derives from the export-led growth hypothesis, that contends that economic growth can be caused and generated not only by investing in labour and capital, but also by adopting an export-oriented approach (Brida et al., 2016). The current line of thought, identified in the literature as TLGH, was triggered by the seminal work of Balaguer and Cantavella-Jordá (2002). The authors based on Spanish data from 1975 to 1997 identified a long-term equilibrium relationship between economic growth and tourism development. In the Spanish case, Granger causality tests confirmed the TLGH, i.e., a one-way impact of tourism economic development on overall economic growth. Oh (2005) contends that the econometric link tourism->economic growth results from the overall importance of the tourism in Spain, assessed by the ratio tourism revenue/GDP. As tourism receipts account for a large proportion of the Spanish GDP, it is hardly surprisingly the impact of the tourism sector on the ups and downs of the Spanish economy.

The tourism-led growth hypothesis (TLGH) is one of the most predominant topics is a key strand of literature focused on the impacts of tourism/in tourism economics (Song et al., 2012). A large number of empirical studies testing the relationship between tourism and economic development

can be found on the literature. The studies available suggests that the causal relationship between tourism and growth is mostly corroborated. Tang and Tan (2017), Nunkoo et al. (2019), and to a certain extent, Zuo and Huang (2018) provide a systematic review and meta-analyses of the TLGH. The authors conclude that the tourism sector positively contributes to economic growth, in most instances, although the impact of tourism on economic growth is contingent on a number of control variables characterizing the countries under analysis. The magnitude and degree of linearity of the relationship tourism->GDP is obviously contingent on the methodology and econometric specification adopted. Based on sample of 87 studies, Perles-Ribes et al. (2017) indicates that 55 of them pointed to an unequivocal relationship between tourism and economic growth, while 16 bore witness to a bi-univocal relationship, and nine of them point to an economic growth impacting tourism growth. Just four studies fail to identify any statistically significant relationship between those variables. The evidence available suggests that the results depend on several technicalities, namely the destination degree of specialization in tourism. Perles-Ribes et al. (2017) concluded that the results are high susceptible to model designs issues and the econometric approaches employed. In a number of circumstances, it is necessary to take into account non-linearities between tourism and economic growth.

Such studies highlighted three main hypotheses about the relationship between tourism development and economic growth: (1) tourism-led growth hypothesis (2) economic-driven tourism growth hypothesis; and (3) a bidirectional relationship hypothesis between tourism development and economic growth (Oh, 2005; Chen & Chiou-Wei, 2009; Aratuo & Etienne, 2019). The economic driven hypothesis is based on the assumption, supported by empirical data (Oh, 2005; Nowak et al., 2007; Payne & Mervar, 2010), that any local bout of economic expansion likely facilitates tourism growth by improving the current levels of physical and human capital, as well as the development of infrastructure, health, and education facilities that led to higher levels of business travellers and domestic tourism. However, in the context of the difficulties and limitations facing islands, namely an undersized domestic market, tourism development at large is only marginally impacted by the domestic tourism segment.

4. METHODOLOGICAL APPROACH

The TLGH is based on the analysis of the relationship between a tourism-related variable and a proxy for economic development. This study analysis data from 1978 to 2019 to examine the validity of the tourism-led growth hypothesis. The series of tourism arrivals, tourism receipts and number of establishments are from the Madeira Statistical Office historical time series dataset. As usual, the series of real GDP and tourism receipts is computed by deflating the aggregates in current prices (GDP, tourism receipts) by the consumer price index. Both series in constant prices were transformed into logarithmic form. The practical advantage of the logarithmic transformation is that the interpretation of the regression coefficients is straightforward. The coefficients can be interpreted as the estimated percent change in the dependent variable for a percent change in the amount of the independent variable.I

In this study, in line with Perles-Ribes et al (2017), we use Real GDP as a proxy for economic growth. Other studies, such as those ones written by Balaguer and Cantavella-Jordá (2002), Nowak et al., (2007) employ GDP rate of growth, while Cortés-Jiménez and Pulina (2010) examine the variable of real GDP per capita rate of growth. With regards to the tourism development variables, we employ international tourism receipts in line with Cortés-Jiménez and Pulina (2010) and Perles-Ribes et al., (2017). While several studies consider the number of international tourist arrivals as a tourism indicator of tourism indicator of the volume of tourism activity (e.g., Katircioglu, 2009,), other studies Brida et al., (2015) and Brida et al., (2016) test the validity of the tourism-led growth hypothesis based on tourism receipts (expenditures by international tourists). Tourism receipts have been widely used as a proxy of tourism activity and an effective measure of the country's tourist demand (Gunduz & Hatemi-J., 2005).

With regard to the controls, Balaguer and Cantavella-Jordá (2002) add the real effective exchange rate as an indicator of price competitiveness of the tourism industry, which is understandable in destinations highly dependent on foreign tourists emanating from countries characterized by highly volatile currencies, which is not the case in Madeira, with most visitors coming from the EU

area. Nowak et al. (2007) and Cortés-Jiménez and Pulina (2010) add the variable capital growth (or "percentage of GDP used for investment as a proxy for capital" (Perles-Ribes et al, 2017,97)), and Cortés-Jiménez and Pulina (2010) examine the impact of the "percentage of the active population who have completed secondary education as a proxy for human resource endowment" (Perles-Ribes et al., 2017, 97). In this study, for reasons of clarity and understandability, we focus our attention only on the nexus tourism receipts-economic growth.

As most times-series variables tend to be non-stationary and share unit-roots' properties, in line with the most commonly employed methodologies, the standard approach adopted in this study adopts the following steps: 1) carry out unit root tests to determine the order of integration of the time series under analysis; 2) tests for cointegration between real GDP and tourism receipts, via Johansen cointegration method and Autoregressive Distributed Lag (ARDL) methodology, based both on linear and nonlinear cointegration tests; 3) and the estimation of a VECM to perform Granger tests (Engle & Granger, 1987; Tang & Tan, 2013; Enilov & Wang, 2021).

This study applies a number of tests for detecting the presence of a unit root in the time series under analysis against the alternative hypothesis stationarity. As usually in the literature, the stationarity of the series is examined using the unit root tests developed by Dickey and Fuller (1979, 1981), Ng and Perron (2001) and the Phillips and Perron (1988). The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests are classical unit root tests used in most studies to determine the order of integration of the series. Most studies performed the Augmented Dickey and Fuller (1981) and the Phillips and Perron (1988) unit root tests. However, to cross-check the results, we also employ the Kwiatkowski, Phillips, Schmidt and Shin test (KPSS) (1992), without structural breaks (Kumar & Patel, 2023). A detailed explanation of such tests can be found on STATA (2021).

This article aims to examine the effects of recent developments in the tourism sector and in the overall economic dynamics of the island on the relationship between tourism development and economic growth. We may expect that such occurrences will correspond to a structural break in the series under analysis. Therefore, we employ unit root tests designed to identify the existence of structural breaks.

Previous studies suggests that the standard ADF test is biased towards the acceptance of the null hypothesisof the null hypothesis of a unit root, in the event of a structural break (Perles-Ribes et al, 2017; Perles et al., 2016). According to Perles-Ribes et al., (2017, 99), the unit root tests adapted to structural breaks "are normally modified versions of the Dickey-Fuller unit root test that include dummy variables to account for the structural breaks" (Perles et al., 2016). In this paper we have tested series GDP and tourism receipts using the estat sbsingle command in Stata statistical software package. In line with Perles-Ribes et al, 2017, due to the limited sample size, we examined the impact of only one endogenously determined structural breaks, based on the Zivot and Andrews (1992) unit root test with a single structural break, and the two-break unit root test developed by Clemente et al. (1998).

In line with the usual practice, we performed a cointegration analysis to determine the long-term relationship between tourism development and growth in Madeira before testing for causality. In line with Perles-Ribes et al. (2017), the cointegration analysis is conducted using (ARDL) approach and the bounds testing developed by Pesaran and Shin (1999) and Pesaran, Shin, and Smith (2001). For comparative purposes we also employ the Johansen's cointegration methodology (Johansen, 1988, 1995; Johansen and Juselius, 1990, 1992), used in previous studies, as well as the Gregory and Hansen approach. The Autoregressive Distributed Lag model (ARDL) was developed by Pesaran and Shin (1999) and Pesaran et al. (2001) to accommodate either I(0) or I(1) or mutually cointegrated variables. The classical methods of identifying cointegrating relationships, such as Engle and Granger (1987) or Johansen's (1988, 1995) methods, or "single equation methods such as Fully Modified [Ordinary Least Squares regression] OLS, or Dynamic OLS" require all variables to be I(1), "or require prior knowledge and specification where variables are I(0) and I(1)" (Perle-Ribes et al, 2017, 99). Perle-Ribes et al., (2017, 99) refer that, in simple non-technical terms, an ARDL is a normal OLS regression with "least squares regression containing lags of the dependent and explanatory variables". In a classical ARDL framework (y,x1, …, xk), y is defined as the number of lags of the dependent variable, x1 stands for the number of lags of the first explanatory variable included in the equation, and xk identifies the number of lags associated with the k-th explanatory variable. The common selection procedures to determine the optimal number of lag lengths are the standard information criteria (e.g., Akaike information criterion (AIC), Schwarz information

criterion (BIC), etc.). A key advantage of the ARDL methodology is that does not demand symmetry in the number of lag lengths, as each variable under analysis may be linked to different number of lag terms. To test the null hypothesis of no cointegration, we need to take into account whether the variables are all I(0) or all I(1). Pesaran et al., (2001) provide tables with the critical values for the cases where all regressors are I(0) or I(1), "suggest using these critical values as bounds for the more typical cases where the regressors are a mixture of I(0) and I(1)" (Perles-Ribes et al., 2017,99).

The ARDL approach in its Error Correction Model (ECM) version, can be described as follows:

$$\Delta yt=\alpha_0+\alpha_1*t+ \Phi y_{t-1}+\delta x_{t-1}+\sum_{i=1}^{p-1} \gamma 0 y_{t-1}+\sum_{i=0}^{q-1} \gamma 1 \Delta x_{t-i}+\varepsilon_t$$

In this case, yt stands for the dependent variable (GDP), xt corresponds to a vector of order k of the independent variables. The first difference is expressed by Δ, and α0 e α1 stand for the constant and "trend", Φ e δ correspond to the long-term parameters and γ0 e γ1 to the short-term parameters. The error term is defined by ε. The identification of relationship between the variables under analysis is based on the jointly statistical significance of the parameters Φ e δ. The H0 implies no long-term relationship, that is, H0=Φ=δ=0, while H1 implies =Φ≠δ≠0, and therefore, a long-term relationship. As mentioned above, Pesaran et al., (2001) provides two sets of critical values for different levels significance level. The first set is linked to the assumption that all variables included in the ARDL model are integrated of order zero, while the second one is associated with assumption that the variables are (1). In practical terms, the null hypothesis of no cointegration is rejected if the value of the test statistic exceeds the upper critical bounds value, while the null is accepted if the F-statistic is lower than the lower bounds value. Other ways, the cointegration test is inconclusive.

As in Balaguer and Cantavella-Jordá (2002), the causality analysis is based on multivariate Granger causality tests Vector Error Correction Model (VECM) in order differentiate between the short- and long-term causality effects. By definition, a variable x Granger-cause y if the variable y can be better predicted by using past (lags) values of both x and y than by using only past values of y (Perle-Ribes et al,2017). The Granger causality test, underlying the relationship between tourism and economic activity, implies the analysis of 4 different scenarios: 1) unidirectional causality, meaning (T->GDP), termed TLGH; 2) unidirectional causality, meaning (GDP->T), and termed conservation hypothesis; 3) bidirectional causality (T<->GDP), designated as feedback hypothesis; e 4) no causality (T ≠GDP), termed neutrality hypothesis (Suryandaru, 2020). The first case, termed "growth hypothesis", if confirmed, corroborates the TLGH, by which a higher level of tourism receipts generates higher levels of economic growth; therefore, further tourism development leads to higher levels of GDP growth, which is equivalent to admit that the tourism sector sustains the economic dynamic and acts as an engine of growth. The second scenario, termed "conservation hypothesis" implies the assumption that higher levels of economic growth entice further tourism development, on the demand-side, notably in the domestic tourism sector, as well as further development in terms of critical infrastructure, amenities, and attractions, which increases the overall attractiveness of the destination. The third scenario is termed the feed-back hypothesis, based on a jointly determination of the tourism demand and GDP dynamics, while the neutrality hypothesis suggests that the GDP growth dynamics is decoupled from the tourism development trajectory. The traditional Vector Autoregression modelling (VAR) approach has been used to test for Granger causality. The identification of the optimal number of lags is a critical issue in the Granger causality analysis. Based on the usual criteria, we use the SCB and AIC criteria to select the lag order for a vector autoregressive models (VAR) or VECM.

The statistical software package STATA 17 was used to perform most of the econometric analysis. The procedure employed in the 80s and 90s to determine the degree of cointegration of a uniequational linear regression model based on two variables (uniequational) followed Engle and Granger (1987), via analysis of the residuals. The most recent approaches employ the Johansen cointegration method and the Pesaran et al (2001) ARDL test. Suryandaru (2020) recommend the ARDL approach, of Pesaran et al. (2001), modified by Kripfganz and Schneider (2018) because it leads to more robust results within the context of small samples. Recent research has explored the nonlinear autoregressive distributed lag (NARDL) approach (Munir and Iftikhar, 2021; Yang et al, 2021; Idowua et al., 2022; Ahmad et al., 2022; Kumar & Patel, 2023; Balsalobre-Lorente et al., 2023).

5. RESULTS

Among the various standard unit root testing procedures available in most statistical packages, the ADF, and PP tests are mostly used ones to test for the stationarity property of each variable. The results are reported in Table 4. The results of the ADF, PP tests, Dickey-Fuller (DF-GLS) test and the Kwiatkowski-Phillips- Schmidt-Shin (KPSS) tests reveal that the series of real GDP and tourism receipts are not stationary in their levels, but stationary in their first differences. Therefore, it can be concluded that both series are integrated of order one (I(1) series). The ADF and PP tests are based on H0: unit root, while the KPSS test is based on H0: stationarity.

Table 4. Traditional unit root tests

ADF test						
	Test statistic	1%	5%	10%	p-value	Conclusão
lnTourismreceipts	-1.116	-3.641	-2.955	-2.611	0.7088	Unit root
lnGDP	-2.142	-3.641	-2.955	-2.611	0.2281	Unit root
ΔlnTourismReceipts	-4.025	-3.684	-2.958	-2.612	0.0000	I(0)
ΔlnGDP	-4.912	-3.684	-2.958	-2.612	0.0000	I(0)

PP test							
	p.value			1%	5%	10%	Conclusion
lnTourismreceipts	0.6860	Z(rho)	-2.031	-18.288	-13.012	-10.520	Unit root
		Z(t)	-1.171	-3.641	-1.955	-2.611	
lnGDP	0.2648	Z(rho)	-1.781	-18.288	-13.012	-10.520	Unit root
		Z(t)	-2.051	-3.641	-2.955	.-2.611	
ΔlnTourismReceipts	0.0000	Z(rho)	-29.919	-18.220	-12.980	-10.500	I(0)
		Z(t)	-4.921	-3.648	-2.958	-2.612	
dlnGDP	0.0000	Z(rho)	-30.961	-18.220	-12.980	-10.500	I(0)
		Z(t)	-4.910	-3.648	-2.958	-2.612	

DF-GLS	Tau (1 lag)	1%	5%	10%	Conclusion
lnTourismReceipts	-2.010	-3.770	-3.303	-2.984	Unit root
lnGDP	-1.025	-3.770	-3.303	-2.984	Unit root

	Test statistic									
KPSS	(0)	(1)	(2)	(3)	Max lags	1%	2,5%	**5%**	10%	Conclusion
lnTourismReceipts	0.447	0.246	0.182	0.152	3	0.216	0.176	**0.146**	0.119	Not stationary
lnGDP	0.907	0.479	0.336	0.200	3	0.216	0.176	**0.146**	0.119	Not stationary

Table 5 presents the results of the unit root tests with one structural break for the variables either in log levels or in first difference. The breaks are endogenously determined by the test. Based on the Zivot-Andrews unit root test and on the test developed by Clemente et al., (1998), we consider one potential shift in the intercept. Based on the results we reject the unit root null hypothesis, for the first differences, because both series appear to be stationary. However, both series are I(1) in log levels. Based on the Zivot-Andrews test, the suggested breakpoints, for the variable GDP, are 1988 and 2009, for the log level form, and 1987 and 2010 for the first difference form. By way of

explanation, for the years concerned, we need to take into consideration methodological considerations, such as an alteration in the calculation methodology of the GDP (around 1988) and the impact of the 2010 natural disaster. For every change in the calculation method, in the absence of a process of harmonization, the first number of the series is clearly above the later part of the previous series. The breakpoints identified by the test developed by Clemente et al., (1998) are rather different and far more difficult to associate to the occurrence of specific events: 1989 and 1999 for the logarithm of the GDP in levels, and 1987 and 1997 for the logarithm of the Tourism receipts in levels.

Table 5: Unit root tests with structural breaks (Zinot-Andrews test)

		Critical Values			Conclusion	Break
Variable	t	1%	5%	10%		
lnGDP	-3.748	-5.43	-4.80	-4.58	I(1)	1988
dlnGDP	-5.877	-5.43	-4.80	-4.58	I(0)	1987
lnTR	-5.279	-5.43	-4.80	-4.58	I(0)	2009
dlnRT	-5.237	-5.43	-4.80	-4.58	I(0)	2010

Table 6: Unit root tests with structural breaks (Clement et al. test)

Variable	lnGDP					
	du1	du2	(rho-1)	Const	Breaks	Conclusion
Coefficient	0.84058	0.52944	-0.66147	7.05666	1989,1999	I(1)
t-statistic	11.165	7.775	-3.516	-		
p-value	0.000	0.000	-5.490		5% critical value	
Variable	dlnGDP					
	du1	du2	(rho-1)	Const	Breaks	Conclusion
Coefficient	0.02331	-0.05892	0.30380	0.03787	1986,2010	I(0)
t-statistic	0.734	-1.939	0.716			
p-value	0.474	0.072	-5.490		5% critical value	
Variable	lnTR					
	du1	du2	(rho-1)	Const	Breaks	Conclusion
Coefficient	0.40748	0.44639	-0.57806	4.86273	1987,1997	I(1)
t-statistic	6.557	8.243	-4.026			
p-value	0.000	0.000	-5.490		5% critical value	
Variable	dlnTR					
	du1	du2	(rho-1)	Const	Breaks	Conclusion
Coefficient	-0.08343	0.09306	-1.01290	0.03514	2006,2010	I(0)
t-statistic	-1.758	1.745	-5.496			
p-value	0.087	0.090	-5.490		5% critical value	

As in general, the unit root tests concluded that the time series under analysis are I(1), it is possible to proceed further with the Johansen cointegration approach. The results are shown below

(table 7). The Trace and statistic maximum statistics point to one cointegration vector. Moreover, both the SBIC and the HQIC estimators suggest that there are one cointegrating equation.

Table 7: Johansen cointegration test: lnGDP=f(lnTouristicReceipts)

Max. rank	Params	LL	Eigenva-lue	Trace stat.	Critical Value 5%	SBIC	HQIC	AIC
0	6	92,788	.	18,541	15,41	-4,103	-4,265	-4,357
1	9	100,434	0,31767	2,8744*	3,76	-4,209*	-4,4052*	-4,589
2	10	101,871	0,06934			-4,189	-4,459	-4,612

The cointegration relationship between the dynamics of tourism development and the evolution of the GDP, based on the later part of the previous number, is reported in the following table. The coefficient estimates in the equilibrium relationship, leading to the following equation, lnGDPt=0,034900+1,471162*lnTRt, correspond basically to the estimated long-run elasticity with respect to GDP, show that the level of Tourism Receipts is elastic in relation to the GDP level. For every 1% of increase in the level of Tourism Receipts, the Statistical office records an increase of around 1,5% increase in the GDP level.

Table 8: Johansen cointegration regression

Variable (GDPt)	Coeff.	Z	p>Z
-ce1			
lnGDPt	1		
lnTRt	-1.471162	-13.76	0.000
const	-0.034900		

As the long-run relationship between tourism receipts and economic growth (measured via GDP at constant prices) can assume different forms (“linear, nonlinear, or both”), we employ an additional type of test for cointegration namely the (1) Gregory-Hansen cointegration test proposed by Gregory and Hansen (1996). Further details on the procedures are provided by STATA (2021).

The results of the Gregory-Hansen cointegration test indicate that the break date is 2012/2013, which might be related to the impact of the 2010 natural disaster crisis (See Table 9); the t-statistic obtained from the ADF procedure with 2 lags is -6,14, which is larger than the critical value of -4.95 at the 5% level provided by Gregory and Hansen (1996), for a change of regime (involving a change in both level shift and a change in in the slope coefficients). In this study, the null hypothesis of no linear cointegration is rejected. However, at the 10% level of statistical significance, we can also reject the null hypothesis, of no linear cointegration for just a change in the intercept. The following lines we explore “intercept shift and trend” approach.

Table 9: Gregory-Hansen unit root tests

	ADF test	Break date	Zt	b	Za	b	5% critical values		
Level shift	-4.60	2012*	-3.56	2013*	-17.68	2013	-4.61	-4.61	-40.48
Trend	-4.48	2013	-4.05	2013	-22.83	2013	-4.99	-4.99	-47.96
Intercept shift and trend	-6.14*	1999*	-3.82	2010*	-20.43	2010	4.95	4.95	-47.04
Intercept and re-gime shift	-4.51	2013	-3.83	2013	-20.30	2013	-5.50	-5.50	-58.58

The estimated long-run relationship between the variables real GDP and tourism receipts is reported in Table 10. The coefficient of the dummy variable is statistically significant, and the coefficients of intercept, trend and tourism receipts are similarly statistically significant. The Gregory-Hansen ADF procedure takes into account the impact of the 2010 natural disaster and any subsequent adjustments in the demand and sector's dynamics. A simple graphic analysis of the evolution of the regional GDP shows a sharp downturn in 2011 and 2012 and then a recovery starting in 2013. Since the econometric analysis is carried out on logarithmic series, it can be concluded that a 1% increase in level of tourism receipts causes real GDP to increase by 1,65%.

Table 10: Table 9: Gregory-Hansen cointegration equation

Variable	Coef.	t	Prob>t
lnRTt	1.652	20.23448	0.0000
TREND(>2013)*lnTR	-1.278	-7.17	0.0000
Trend	7.250	3.176385	0.0036
Const	-0.984	-2.260641	0.0296
N=42; F(3, 38)= 164.25; Prob>F=0.000; R-squared=0.9284; Adj R-squared=0.9228			

As the variables under analysis are I(1), but stationary in their first differences, we apply the bound test to identify the existence of a cointegration, which implies a long term relationship between GDP and tourism. The bounds test suggests a long-term relationship between Tourism Receipts and GDP, with the variable Receipts, defined as a proxy to tourism development, having a truly significant impact on the GDP dynamics, at the 5% level of statistical significance. In the long term, the number of arrivals and their spending behavior determines the level of GDP. With regards the ARDL and bound test approach, applied to the conservation hypothesis, both the F-stat e t-stat point to the absence of a long-term relationship between tourists' receipts and GDP, as shown in Table 11, which sounds logical based on the small numbers of domestic tourists.

Table 11: Bounds test

Bounds test: lnGDP=f(lnTourismReceipts (Tr)

	I(0)1%	I(1)1%	I(0)5%	I(1)5%	I(0)10%	I(1)10%	F/t-test	p-value I(0)/I(1)		Conclusion
Critical values	7.608	8.808	5.172	6.130	4.147	4.991	6.214	0.025	0.048	
	-3.583	-3.394	-2.905	-3.287	.-2.569	-2.932	-3.248	0.023	0.054	co-integration

Bounds test: lnTourismReceipts=f(lnGDP)

	I(0)1%	I(1)1%	I(0)5%	I(1)5%	I(0)10%	I(1)10%	F	p-value I(0)/I(1)		Conclusão
Critical values	7.608	8.808	5.172	6.130	4.147	4.991	4.536	0.077	0.132	
	-3.583	-3.394	-2.905	-3.287	.-2.569	-2.932	-3.010	0.040	0.086	H0 accepted

Finally, Table 12 provides data on the results of the Granger causality test. The Granger causality theory (Granger, 1969) is based on the assumption that if two variables (x, y) are stationarity and cointegrated, at least one unidirectional causality relationship among them must exist (x->y; y->x). We apply a Vector Auto-Regression (VAR) model to investigate the Granger causality relationship. The results indicates that at the 1% significance level, the null hypothesis that real GDP does not Granger-cause Tourism Receipts is accepted. Moreover, the tourism-led growth hypothesis is validated based on a unidirectional Granger causality running from to tourism receipts arrivals real GDP. In this study, besides testing the Granger causality approach without including a deterministic trend or structural breaks, we also tests the Granger causality approach with a constant, a deterministic trend, the dummy variable exogenous variables (crisis 2012). The results appear to be consistent

based on a one-side relationship and not depending on whether a structural break is included. The results for the variables in levels with no structural breaks, favour the led growth hypothesis, corroborating the mostly representative and prevalent conclusion in the literature.

Table 12: Granger causality test

Equation	Excluded	chi2	df	Prob > chi2
dlnGDP	dlnTR	7.2815	2	0.026
dlnPIB	ALL	7.2815	2	0.026
dlnTR	dlnGDP	2.3311	2	0.312
dlnTR	ALL	2.3311	2	0.312

Model	Ho	Chi-square	p-value
lnGDP=f(lnTR)	TR does not Granger cause GDP	7.28	0.0262
Ln(TR)=f(GDP)	GDP does not Granger cause TR	2.33	0.3117

The results in Table 13 show that the coefficient of the error correction term in Model 1 is negative and statistically significant at the 1 percent level. This points a robust long-run unidirectional effect running from lnTR to lnGDP. It also confirms the long-run relationship identified in the previous modified ARDL model. Conversely, the error correction in Model 2 is positive and statistically insignificant (at the 5% level).

Table 13: VECM model

Regressors	Model lnGDP	Prob>z	Model lnTR	Prob>z
ECMt-1	-0.1853815	0.009*	.0.1478863	0.072***
ΔlnGDPt(-1)	0.0714767	0.627	-0.2317883	0.174
ΔlnTRt(-1)	0.0974738	0.518	0.4792704	0.006*
Const	0.0248814	0.057***	0.0311899	0.039**

In the formulations outlined above, ΔlnGDPt(-1) refers to the first differences (in logs) of the variable GDP, ΔlnTRt(-1) refers to the tourism receipts and ECM referes to the error correction term, which is the defined as estimated residuals from the cointegration regression. Overall, the results indicate that the models fit the data well. In the lnGDP equation, the lagged EC term (-0,18538; prob=0,009) is negative, and the coefficient is significantly different from zero. The coefficient of the lagged EC term for tourism receipts is positive but significantly insignificant at the 5% level of statistical significance (0,1478863; prob=0,72). The short-run dynamics are understood through the individual coefficients attached the first difference terms. The analysis of the short-term relationship between the variables examined in this study demonstrated that the variable GDP is not impact by both variables. In the case of tourism receipts regression, the effect of the one lag of the variable tourism receipt is significant positive.

6. CONCLUSIONS

This research assesses the long-run relationship and causality tourism development and economic growth in Madeira by using the new bounds testing approach developed by Pesaran et al. (2001), modified by Kripfganz and Schneider (2018). We also apply the Gregory-Hansen cointegration methodology to detect the existence of breaks and determine their location. The study reveals that the natural logs of both variables (GDP and Tourism Reciepts) are I(1) and cointegrated according to the ARDL methodology. Moreover, the Granger-causality test between these variables based on a bivariate vector error-correction model (VECM) also corroborates the Tourism-Led Growth Hypothesis (TLGH). An advantage of this study lies in employing different methodologies to identify the order of integration and the occurrence of structural breaks. The tests carried out in this study

suggests that the relationship between tourism development and economic development is a relatively stable one, and capable to resist adverse shocks.

The cointegration between these variables is also confirmed in a more traditional ECM setting. In the same vein, the short-run Granger causality also corroborates the TLGH hypothesis in the case of Madeira. In line with expectations, there are no reasons to acknowlwdge short-run causality by tourism receipts on GDP. In conclusion, these findings suggest that the volume of tourism receipts is a critical generator and important of overall long-run dynamics of economic development in Madeira.

As one can infer from reading the local newspapers, there is little doubt that for local policymakers, operators and journalists the leading role and engine of growth rests on the tourism sector. However, whether and how the tourism development can be translated into enduring development effects remains clouded in questions about the effective impact of the tourism sector on the rest of the economy, from a pure quantitative point of view. Quite surprisingly there is no ample evidence available and studies to support the more enthusiastically assertions, namely those ones that promote the belief that the region´s tourism's potential remains underdeveloped in a number of market niches. Such enthusiasm should not surprise anyone. The narrow economic base that characterizes most SIDS, implies that most islands economies have little choice but to act to further develop the tourism sector despite the many risks and challenges in a number of critical areas.

In line with Balaguer and Cantavella-Jordá (2002), we concluded that the TLGH, in the case of Madeira, has a unidirectional causality relationship running from tourism development and economic growth. Each increase of 1% in the volume of receipts leads to an increase of 1,65% in the level of GDP. Madeira follows the general trend on islands, as tourism has a significant influence on the economic growth dynamics. Tourism development is not just about increased number of arrivals and tourism receipts; it is also a means of developing high-order capabilities and managerial and organisation practices, as well as transferring skills, and new business models to develop from scratch culturally oriented market niches. Tourism development is also matter of bring under control a number of technical and environmental constraints such as overtourism and environmental degradation.

While tourism development is understood as a panacea for economic growth, island´s over-reliance on mass tourism may be counterproductive and highly risky. The excessive reliance on a single major source of economic growth, plus the impact of natural disasters on the environment which several destinations operate cannot be ignored. As elsewhere, tourism development contributes to foreign exchange earnings, not relevant in the case of Madeira, but also provides job opportunities (about 16,7% of the total labour force), invigorates the whole of the rural economy, and thereby stimulates overall economic growth. Given the limits to development, most islands ultimately chose to develop some non-orthodox development approach, in one way or another, such as a) the commercialization of natural strategic resources (e.g, strategic importance, etc.), b) the internationalization of distinctive social and cultural endowments (such as ´musical assets´, and c) the developmanet of ´alternative´ sectors such as tax havens, or a clientelist approach based on rents based on income transfers based, EU and national financial support, etc. Both alternatives a) and c) are under increasing threat, for a number of reasons (climate change, the changing political landscape in the EU). As mentioned by Razak (1995, 457) states, for "small places in a rapidly changing world, the uncertainty is tremendous". Only the tourism sector, offers a glimpse of predictability.

This study has some limitations. Firstly, this study is restricted to annual data, in the case of variable GDP, published annually by the Statistical Office. Further analysis of this model may employ annual data converted to a quarterly frequency in order to generate a larger sample. Other variables such as public expenditure may be used as control variables in an attempt to replicate the functioning of an island economy with much more detail. And detailed attention must be paid to the NARDL approach in order to study the impacts of both positive and negative shocks that may differ to a large extent.

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