UNIVERSITY OF ALGARVE

FACULTY OF ECONOMICS

REGIONAL EFFECTS OF TOURISM IN PORTUGAL: A MULTIVARIATE ANALYSIS

HUGO SOARES GONÇALVES

Dissertation to obtain the Master's Degree in

Tourism Economics and Regional Development

Work made under the supervision of

Professor Doutor Jorge Miguel Lopo Gonçalves Andraz

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Authorship Statement

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Work Authorship Declaration

I declare to be the author of this work, which is unique and unprecedented. Authors and works consulted are properly cited in the text and are in the listing of references included.

HUGO SOARES GONÇALVES

……..
(signature)

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To my mother.

ACKNOWLEDGEMENTS

This dissertation has been developed with a strong will and enthusiasm on my part, together with perseverance and determination to overcome the adversities and obstacles that have arisen, both in scholar part and in the preparation of this dissertation. However, the final result was only possible due to the contribution of several people, who I neither could neither was fair to leave to thank.

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RESUMO

Várias estatísticas elaboradas por organismos internacionais atestam o papel do turismo como um importante estímulo para as economias receptoras, com impactes importantes na criação de emprego, na criação de oportunidades de investimento e como fonte de aumento do rendimento. Segundo a Organização Mundial de Turismo das Nações Unidas (UNWTO), as chegadas de turistas internacionais cresceram 5% nos primeiros nove meses de 2013 e as receitas nos destinos turísticos mundiais atingiram um valor estimado de US$ 1.159 biliões em 2013.

O turismo tem sido igualmente uma importante fonte de crescimento económico em Portugal. Segundo o World Travel & Tourism Council (WTTC), a contribuição total do turismo para o PIB em 2012 ascendeu a € 26,4 biliões, correspondendo a 15,9% do PIB, e espera-se um crescimento anual de 1,6% até 2023. A contribuição total para o emprego foi de 860.500 postos de trabalho em 2012, correspondendo a 18,5% do emprego total e espera-se um crescimento de 1,0% ao ano até 2023.

Dada a relevância do setor turístico em Portugal espelhada nas estatísticas, a presente dissertação pretende contribuir para clarificar os efeitos económicos do turismo em Portugal ao nível regional, em termos do seu contributo para o crescimento económico e para a redução das assimetrias regionais. São estimados os efeitos agregados da atividade turística, medida pelo número de dormidas de turistas nacionais e internacionais em hotéis, hotéis-apartamentos, apartamentos turísticos, aldeamentos turísticos, motéis, estalagens, pousadas e parques de campismo, no desempenho económico do país através dos seus efeitos nas variáveis do setor privado - investimento, emprego e produto. O objetivo final é determinar efeitos regionais do turismo e avaliar se eles são distribuídos de forma equilibrada entre as cinco regiões NUTS II do continente - Norte, Centro, Lisboa, Alentejo e Algarve. Esta análise tem igualmente como objectivo suscitar o debate acerca da questão das assimetrias regionais e da concentração regional da atividade económica no país.

A metodologia baseia-se na estimação de modelos vetoriais auto-regressivos para Portugal e para cada uma das cinco regiões NUTS II, os quais relacionam o investimento privado, o emprego privado, o produto e o turismo. Os modelos regionais

incluem ainda o turismo em outras regiões do país. Esta abordagem possibilita a estimação dos efeitos para cada região do turismo na própria região, os chamados efeitos diretos, bem como dos efeitos do turismo localizado em outras regiões, os chamados efeitos de rede ou efeitos spillover. Desta forma, a abordagem metodológica considera os efeitos dinâmicos e de retroalimentação entre todas as variáveis referidas, ao mesmo tempo que distingue entre efeitos diretos e efeitos de rede.

Os resultados empíricos permitem destacar alguns fatores importantes da atividade turística em Portugal. Em primeiro lugar e a nível agregado, o desenvolvimento do turismo tem sido um setor estratégico para promover o crescimento a longo prazo, dado que o turismo tem impactes positivos sobre o investimento privado e emprego. Estima-se que um aumento de mil dormidas induz, no longo-prazo, um aumento acumulado de € 1,162 milhões em investimento privado e promove a criação de cerca de 35 novos empregos no setor privado. Portanto, a nível nacional, o turismo tem importantes impactes positivos no investimento e emprego a longo prazo. Estes resultados estão em linha com o impacte positivo estimado no produto, já que se estima que o aumento de mil dormidas originará um aumento acumulado no produto de € 1,875 milhões no longo prazo.

Em segundo lugar, os resultados sugerem a existência de fortes efeitos de rede. Em particular, estes efeitos correspondem a 42,0% dos efeitos totais no investimento privado, a 22,4% dos efeitos totais no emprego e a 21,9% dos efeitos totais no produto.

Em terceiro lugar, as regiões beneficiam de forma diferente do turismo localizado na região e do turismo localizado em outras regiões. Em geral, o padrão geográfico que emerge a partir dos resultados é que os efeitos diretos são mais importantes nas regiões centrais do Centro e Alentejo, enquanto os efeitos de rede são mais importantes nas regiões localizadas nos extremos do país, Norte e Algarve e são ainda relevantes na região de Lisboa. Dada a distância relativamente curta entre as regiões, os resultados parecem confirmar a existência de importantes relações económicas entre estas regiões e o resto do país e ainda que os turistas que se localizam numa dada região do país tendem a realizar visitas às regiões Norte, Algarve e Lisboa.

Em quarto lugar, os resultados sugerem igualmente implicações políticas relevantes para o processo de decisão sobre futuras promoções turísticas. Ao considerar os efeitos relativos para cada região do turismo na região e do turismo em outras regiões, os

resultados sugerem que se o objetivo for o de promover o investimento e emprego privado localmente, então as regiões do Norte e Algarve terão maior interesse em pressionar as autoridades para a promoção geral do turismo do país, enquanto que as outras regiões terão maior interesse na promoção turística local. Em termos de efeitos sobre o produto, a maioria das regiões tem interesse na promoção do turismo na própria região, com exceção do Algarve.

Em quinto lugar, o Centro e o Alentejo são as regiões onde o turismo gera maiores efeitos sobre o investimento privado a nível nacional, enquanto que o turismo no Centro, Lisboa e Alentejo gera os maiores efeitos sobre o emprego nacional. Finalmente, os efeitos mais significativos sobre o produto do país advêm do turismo na região Centro, seguido pelo turismo localizado no Alentejo e em Lisboa. Em geral, podemos dizer que o turismo no Centro é o que apresenta os maiores benefícios marginais em termos do desempenho económico do país como um todo. A maior parte dos benefícios, contudo, tendem a ser localizados na própria região. Lisboa e Alentejo são as outras regiões com impactes importantes a nível nacional, mas que também captam a maioria dos efeitos. Por sua vez, o turismo no Norte e Algarve tem uma reduzida contribuição ao nível nacional, mas gera importantes efeitos de rede. Este comportamento destaca a possibilidade de implementação de políticas que maximizam o crescimento económico nacional e ao mesmo tempo contribuem para a redução das disparidades regionais.

Em sexto lugar, os resultados sugerem que o turismo tem contribuído para a concentração da atividade económica em Lisboa e no Centro e, nesse sentido, tem contribuído para reduzir as assimetrias entre a região Centro e as duas regiões com maior peso no conjunto do país, Lisboa e Norte. As regiões Norte e Alentejo obtêm benefícios consistentemente mais baixos do que o seu tamanho, enquanto que os benefícios captados pelo Algarve são principalmente devido à grande importância do turismo na região. Esta análise sugere que o turismo nas duas últimas décadas tem tido alguns impactes sobre redução das disparidades entre algumas regiões, mas também contribuiu para aumentar a diferença entre o Alentejo e o resto do país.

PALAVRAS-CHAVE: Turismo, Portugal, modelos VAR, análise de impactos, análise regional, efeitos de rede.

ABSTRACT

This dissertation estimates the effects of tourism on regional private-sector variables with the objective of assessing tourism's contribution to economic growth and regional asymmetries. The analysis identifies the regional distribution of the effects of tourism in the country, the greatest beneficiaries from spillover effects and the greater contributor regions to national economic growth and regional asymmetries. This research brings new evidence of tourism as a tool of economic growth and to reduce regional asymmetries in Portugal and it is therefore an important contribution to related literature.

The methodology is based on the estimation of vector autoregressive models for Portugal and for each region, distinguishing between direct effects and spillover effects. Tourism has promoted long-term growth in Portugal through direct and spillover effects. Lisbon and the Center are the regions that benefit the most, while the Alentejo gets the lowest effects. The direct effects are generally more important in the central regions, of the Center and Lisbon, while spillovers are more relevant in the Algarve and North. Moreover, private investment in these latter regions benefits largely from tourism elsewhere. While contributing to the country's economic performance, tourism in the Center and Alentejo also contributes to reduce regional asymmetries, but tourism in Lisbon strengths the country´s macrocephaly.

KEYWORDS: Tourism, Portugal, VAR modelling, impact analysis, regional analysis, spillover effects.

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ABBREVIATIONS LIST

ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
BIC	Bayesian Information Criterion
CGE	Computable General Equilibrium
EU	European Union
GDP	Gross Domestic Product
GEMP	Growth Rate of Employment
GGDP	Growth Rate of Private Output
GINV	Growth Rate of Private Investment
GTOUR	Growth Rate of Tourism
GTOURELSE	Growth Rate of Tourism in Other Regions
INE	National Institute of Statistics
I-O	Input-Output
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organization for Economic Co-operation and Development
PERC	Percentage value
SAM	Social Accounting Matrix
UNWTO	United Nations World Tourism Organization
VAR	Vector Autoregressive
WTTC	World Travel & Tourism Council
€	Euro currency
US$	United States Dollars

CHAPTER 1. INTRODUCTION

Tourism is assumed as one of the main economic sector in many economies. According to the United Nations World Tourism Organization (UNWTO), international tourist arrivals grew by 5% in the first nine months of 2013, to reach a record of 845 million worldwide, an estimated 41 million more than in the same period of 2012. Also, the receipts in destinations worldwide, from expenditure by international visitors on accommodation, food and drink, entertainment, shopping and other services and goods, reached an estimated US$ 1,159 billion in 2013. Growth exceeded the long-term trend, reaching 5% in real terms (taking into account exchange rate fluctuations and inflation). The growth rate of receipts matched the increase in international tourists' arrivals, also up by 5%, reaching US$ 1,087 million in 2013 (UNWTO, 2014).

These figures explain the role of tourism as an important stimulus for recipient economies, with important impacts on jobs creation, investment opportunities, and income. Furthermore, the direct contribution of travel and tourism to the world economy grew by 3.1% in 2013, contributing US$ 2.2 trillion to world gross domestic product (GDP) and 101 million jobs (WTTC, 2014).

Tourism has also been a major source of economic growth in Portugal. According to WTTC (2013), the total contribution of tourism to GDP in 2012 was € 26.4 billion, corresponding to 15.9% of GDP, and it is expected to grow by 1.6% per annum to € 31.0 billion, corresponding to 6.3% of GDP, by 2023. The total contribution to employment was 860,500 jobs in 2012, or 18.5% of total employment and it is expected to grow 1.0% per annum to 954,000 jobs, or 20.7% of total employment, by 2023. About a quarter of foreign investment is motivated by the touristic trade.

The above statistics provide the overall picture of the importance of tourism in Portugal. Both the increasing number of tourists and the sector’s strategic importance have led the Portuguese economic and political agents to pay special attention to it by taking active measures towards its sustainability against competitive alternative destinations. Therefore, it is not surprising that business and public organizations are increasingly interested in the economic impacts of tourism at national, regional or even local levels. From this point of view, the dissertation intends to contribute to the literature and help

public and private tourism operators in the political, management and marketing decisions.

Notwithstanding the strong evidence that tourism has been a powerful instrument to promote long-term growth in Portugal and in bringing the country up to European Union (EU) standards, the impacts of tourism on major macroeconomic variables have not received the necessary importance in the literature. However, applied studies on other issues are abundant, such as tourism sustainability (Correia, Videira, Alves, Ramires, Subtil and Martins, 2006), environment (Pintassilgo and Silva, 2007), tourists and residents perceptions (Vareiro, Remoaldo and Ribeiro, 2013), tourists' profiles (Correia, Valle and Moço, 2007), demand modelling (Daniel and Rodrigues, 2011; Andraz, Gouveia and Rodrigues, 2009; Daniel and Ramos, 2002) or the impact of specific events (Andraz and Rodrigues, 2010).

By using data on gross domestic product, private employment, private investment and tourism, this research intends to contribute to the tourism international literature in three directions. First, it reports estimates of the effects of tourism on macroeconomic variables at the national level. Although these estimates at the national level are not the central focus of this research, they are relevant from a national perspective and important to calibrate the regional analysis that follows. In fact, the magnitude of the aggregate effects may not provide enough information as to the regional incidence of these effects. Significant positive aggregate effects could be associated with balanced positive effects across regions or could cover different regional gains, promoting therefore regional asymmetries.

On another vein, the existence of regional spillover effects of touristic activity and their magnitude have not been addressed in the literature despite some studies (see, for example Haughwout, 1998, 2002) state that the existence of spillover effects should be considered in regional impacts analysis. The positive effects of tourism in a region can be induced by tourism inside the region, but it can also benefit from tourism in other regions, as the short distances and the existence of good accessibilities are susceptible to stimulate tourists installed in one region to make short duration visits to other regions. Also the economic effects of tourism in a region may also be felt in other regions through the existence of economic relations among regions. This leads to the idea of spillover effects of tourism, corresponding to the idea that a region may capture benefits

from tourism located in other regions. Therefore, the second objective is to estimate the effects of tourism on macroeconomic performance at regional level, considering the existence of spillover effects. Third, this study intends to determine in which locations tourism generates the largest benefits for each region as well as, from the national perspective, in which regions tourism generates the largest benefits for the whole country. These results provide information about tourism's contribution to the concentration of economic activity, and therefore its contribution to regional asymmetries and to national economic growth. In particular, they can be very informative on whether policy decisions on tourism promotion can be successful in promoting the country's economic growth and, simultaneously, in reducing regional asymmetries. This is a sensitive issue for Portugal since the promotion of the convergence to the EU life patterns and the reduction of regional asymmetries have been on the basis of the structural European funds the country has received in the last decades.

This study is, therefore, in the confluence of the empirical literature on the regional effects of tourism and on the relevance of regional spillovers. Methodological speaking, it departs from the production function approach and respective production inputs (labor and capital), but adopts a dynamic multivariate approach based on the estimation of vector autoregressive models for the whole country and for each of the five contiguous NUTS II regions. With this approach, dynamic feedbacks among variables are fully considered, as they are essential to understand the relationship between tourism and private-sector variables. In fact, tourism affects output directly, as it is a direct input to the productive process. But it also affects output indirectly through the use of private inputs – labor and capital. An increase of tourism lead to a demand increase of labor and capital which, in turn, affects output positively. Moreover, the evolution of private-sector variables can affect the evolution of tourism. The increase of output provides the economic agents with higher income to finance new investments and create new job opportunities, which in turn contribute to improve services quality and to increase the country's capacity to receive more tourists.

The remainder of this dissertation is structured as follows. Chapter 2 reports a portrait of the most recent literature on tourism mainly focused on the methodologies, aggregation levels and results of the studies focused on Portugal and abroad, allowing highlighting the main contributions of this dissertation. Chapter 3 describes the dataset and reports

preliminary data statistical analysis. Chapter 4 describes the main methodological aspects of models estimation and correspondent estimates. Chapter 5 reports the central empirical results. Finally, Chapter 6 reports the main conclusions and policy implications as well as ideas for future research.

CHAPTER 2. LITERATURE REVIEW

The literature on the relationship between tourism and economic growth traces back to the work of McKinnon (1964) which stresses that tourism´s contribution to growth is reflected on efficiency enhancement and by facilitating the exploitation of scale economies in local activity sectors. This work has generated a large body of empirical research on the effects of tourism on economic growth, which, according to the methodology adopted, range from those originally based on Keynesian multipliers to those based on the estimation of dynamic structural econometric models.

In early stage, the analysis of the economic impact of tourism relied on the estimation of Keynesian-based multipliers (see, for example, the seminal works of Archer and Fletcher, 1988, 1990 and Archer, 1977), by considering the propensity of consumption by different visitor segments, and shares of visitor spending in different industries. Given the limitations of this approach, addressed by Cooper, Fletcher, Wanhill, Gilbert and Shepherd (1998), the adoption of general equilibrium techniques such as Input-Output (I-O) analysis became wider popular (see, among others, Archer and Fletcher, 1996 and Archer, 1995). By considering the transactions among all sectors in the economy, this approach makes possible to analyse how tourism expenses and revenues spread out to all the other economic sectors. Therefore, the direct, indirect and induced effects of tourism are fully considered as stressed in several studies (e.g. Loomis and Walsh, 1997 and Fletcher, 1989)[1].

However, the static and linear nature of the input-output modelling, the exogeneity of prices and the implicit assumptions that resources are unlimited and move freely among sectors, have been pointed by many authors as the reason for the high and unrealistic tourism impact estimates provided by the input-output modelling (see, for example, Dwyer, Forsyth and Spurr, 2004, 2006, and Zhou, Yanagida, Chakravorty and Leung, 1997). Given these considerations, the interest has moved towards the adoption of Computable General Equilibrium (CGE) models, which include general specifications

[1] Several authors define the different types of tourism effects, such as Archer (1995). The direct effects can be defined as the initial effects resulting directly from the touristic activity, on sales or income; the indirect effects results of the arise of expenditure on destination and the increase of business' relationships and the induced effects are related with the expenses that locals made when direct and indirect effects are higher (Dwyer, Forsyth and Dwyer, 2010). The concepts of direct and indirect effects are different from those used in this research (see previous chapter, page 3).

of the economic agents' behaviour, considering, at the same time, all the feedback effects among sectors with a mechanism of prices adjustment. Applications of CGE models to tourism include, among others, Dwyer *et al.* (2006) and Adams and Parmenter (1995) for Australia, Zhou *et al.* (1997) for Hawaii, Blake (2000) for Spain, Blake, Sinclair and Sugiyarto (2001) for the United Kingdom, Blake and Sinclair (2003) for the United States, Zhang, Madsen and Jensen-Butler (2007) for Denmark.

In the broad category of dynamic structural econometric models, time series, sectional and panel data models have been widely used to estimate tourism economic impacts or the impact of specific mega events (e.g. Allmers and Maennig, 2009, Hagn and Maennig, 2009, Andersson, Armbrecht and Lundberg, 2008 and Wyludda, 2008). However, a large body of literature, using structural econometric models, has emerged over the recent years mainly focused both on tourism economic impacts and the direction of causality between tourism development and economic growth considering several countries or country-specific analysis either at national or regional levels. Studies using panel data for several countries include, among others, Eugenio-Martin, Morales and Scarpa (2004) for a set of Latin American countries, Lee and Chang (2008) for OECD and non-OECD countries, Mello-Sampayo and Sousa-Vale (2012) for a set of European countries, Sequeira and Nunes (2008) for ninety-one countries, Chang, Khamkaew and McAleer (2010) for a panel of one-hundred and fifty-nine countries, Fayissa, Nsiah and Tadesse (2009) for seventeen Latin American countries, Narayan, Narayan, Prasad and Prasad (2010) for a set of Pacific Island countries and Chang, Khamkaew and McAleer (2009) for East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, North America, South Asia and Sub-Saharan Africa. Findings of these studies show, in general, that although causal relationship between tourism and economic growth is generally supported, the strength and the direction of the relationship changes over country groups.

Eugenio-Martin *et al.* (2004), show that tourism has significant positive impact on economic growth performance of low and medium income countries, while Lee and Chang (2008) found unidirectional causality from tourism to GDP in OECD countries and bi-directional relationship in non-OECD countries. Mello-Sampayo and Sousa-Vale (2012) state that tourism impacts positively on GDP, mainly in Northern countries. The same evidence of unidirectional relationship from tourism to GDP is found for the

Pacific islands countries by Narayan *et al.* (2010), while Sequeira and Nunes (2008) and Fayissa *et al.* (2009) argued that tourism promotes economic growth, even in poor countries.

Country-specific studies cover a large array of countries. These studies include, for instance, Balaguer and Cantavella-Jordá (2002) for Spain, Ghali (1976) for Hawaii, Gunduz and Hatemi-J (2005) for Turkey, Narayan (2004) for Fiji, Katircioglu (2009) for Cyprus, Dritsakis (2004) for Greece, Cortés-Jimenéz and Pulina (2010) for Spain and Italy, Oh (2005) for South Korea, Durbarry (2004) for Mauritius, Lee and Chien (2008) and Kim, Chen and Jang (2006) for Taiwan, Mishra, Rout and Mohapatra (2011) for India, Brida, Carrera and Risso (2008) for Mexico and Croes and Vanegas (2008) for Nicaragua. By estimating vector autoregressive models (bivariate models in most cases) with error correction mechanisms, these studies report different evidence on the direction of causality between growth and tourism. However, these studies follow the recommendation stated in Zapata and Rambaldi (1997) and Gujarati (1995), according to which the relevance of the vector autoregressive modelling had begun to be increasingly recognized in the literature since the consideration of dynamic feedback effects lead to more reliable estimates.

Tourism-led growth hypothesis is confirmed in Spain by Cortés-Jimenéz and Pulina (2010) and Balaguer and Cantavella-Jordá (2002), and for Hawaii and Turkey by Ghali (1976) and Gubduz and Hatemi-J (2005), respectively. The reverse hypothesis of growth-led tourism is found in Cyprus, Fiji and Korea by Katircioglu (2009) and Narayan (2004). Finally, the majority of studies conclude that for most countries there is bidirectional causality between tourism development and economic growth.

An important body of literature is also focused on the relationship between tourism development and economic performance at regional and local levels, using several econometric approaches. Examples of recent studies include Paci and Marrocu (2013), Klytchnikova and Dorosh (2012), Cortés-Jiménez (2008), Burnett, Cutler and Thresher (2007) and Zhang *et al.* (2007).

Zhang *et al.* (2007) use a general equilibrium model and they found that tourism activity benefits Danish regions, namely in terms of employment. In urban areas tourism multipliers tend to be higher but in rural areas tourism is relatively more important. Cortés-Jiménez (2008) concludes that touristic activity contributes positively to regional

economic growth in Spain and Italy, although the geographical pattern of impacts is related to the tourists' origins. On the same vein, Paci and Marrocu (2013) argued that domestic and international tourism is important for economic growth in Europe, however domestic tourism have higher impact in regional and local economies due to the existence of spatial spillovers. Focusing on the provinces of Panama, Klytchnikova and Dorosh (2012) used a Social Accounting Matrix (SAM) model to estimate the impact of tourism in income and employment. Their work support the conclusion that tourism has positive impacts in the country but also in some regions, beneficing more peripheral zones and contributing to the reduction of the poverty. By other side, Burnett *et al.* (2007) conclude that tourism does not promote a significant economic growth due to crowding out effect since tourism sector is very dependent of low-wage workers. Nevertheless, the authors found that tourism is the best activity to invest in, when compared with other alternative activities.

The relevance of tourism in Portugal has justified the proliferation of applied research focusing the Portuguese reality. Several issues have been addressed in these studies, such as the impacts of specific events (Andraz and Rodrigues, 2010; Ribeiro, Viseu, Rodrigues and Delalande, 2004), innovation in tourism (Meneses and Teixeira, 2011; Leitão, 2006), tourism destinations (Santos, Ambrósio, Correia and Peres, 2013; Corfu, Breda and Costa, 2006), tourism demand (Ramos and Rodrigues, 2013; Daniel and Rodrigues, 2011; Barros, Butler and Correia, 2010 and Mello and Fortuna, 2005) or forecasting analysis (Andraz *et al.*, 2009). Only a reduced number of studies reports estimates of tourism economic impacts at the national level using a bivariate VAR approach (for example, Bento and Santos, 2012). Recently and through a panel data analysis, Leitão (2011) analyzed whether tourism induces economic growth. A few studies, to our knowledge, explore the regional dimension. Silva and Silva (2003) analyzed the role of tourism in the industrial context in several Portuguese regions. Soukiazis and Proença (2008), using panel data, show evidence of the contribution of tourism to regional convergence. On the same direction, Neves (2009) analyses the contribution and importance of tourism activity in NUTS II regions over the period 1990-2007, through a panel data analysis. Following on the same vein, and focusing the Center region, Eusébio (2006) proved that tourism was responsible for 3.9% of the production and 2.6% of the households' earnings in 2003.

The issue of regional spillover effects and the effects of tourism to regional asymmetries and regional concentration of economic activity has not been addressed in detail by any study applied to Portugal, although it has been superficially included in regional analysis for other countries. For example, Yang and Wong (2012) focused the spillover effects on tourism flows to several Chinese cities, both inbound and domestic, through a spatial panel data model. On the same direction, Klytchnikova and Dorosh (2012) discussed the leakages effects on regions of Panama, whereas Zhang *et al.* (2007) use data for Denmark and Aguayo (2011) provides evidence for Central and Baltic countries.

By acknowledging the above mentioned studies, it becomes clear that several models and techniques have been employed to measure the economic impact of tourism on national, regional and local economies. Such methods depend upon the goals of the analysis, data availability and hypothesis assumed in the studies. Nevertheless, notwithstanding the variety of conclusions, it is fairly to say that the possibility of reverse causality between tourism and product should not be excluded. It is also evident from the literature that economic impact studies should adopt dynamic models and minimize the adoption of hypothesis regarding the economy.

While these arguments open an "opportunity window" for the adoption of the VAR approach in this study, accounting for the direct and indirect effects, the lack of information of tourism economic impacts in Portugal justifies the research for this country, at the regional level. Given the absence of information about the existence of spillover effects and since they can be decisive to the regional decomposition of the effects at the national level, their consideration in this study can be viewed as an additional contribution to the literature on the economic effects of tourism.

CHAPTER 3. DATA AND PRELIMINARY ANALYSIS

This chapter reports the data sources, the data main stylized facts, as well as the tests for unit roots and co-integration, both at the aggregate level and regional level.

3.1 Data sources and description

The dataset is composed by annual data on private-sector macroeconomic variables, in particular gross domestic product (hereinafter output), employment, gross fixed capital formation (hereinafter private investment) and the number of overnight stays of domestic and international tourists in hotels, apartment hotels, tourist apartments, tourist villages, motels, bed and breakfasts, inns, guesthouses and camping parks. The latter is used as a proxy for touristic activity (hereinafter tourism). Both monetary variables, product and investment, are in millions of constant 2006 euros and the employment is in thousands of full-work employees. All data are in logarithms. The original databases are presented in the Annex A.

The above mentioned macroeconomic variables are widely used in the literature focused on the evaluation of economic impacts (see, for example, Aguayo, 2011; Dritsakis, 2004 and Archer and Fletcher, 1996). The option for measuring tourism as the number of overnight stays is due to the lack of consistent information on other variables such as tourists' expenditures. However, the use of this proxy is not new. This proxy for touristic activity has also been used in recent works, such as Paci and Marrocu (2013) or Cortés-Jiménez (2008), as it reflects the length of stay and therefore it provides information about the occupation rate of touristic facilities. In this way, it is more informative than other variables such as the number of arrivals, which do not provide information on such dimensions.

This study considers aggregate data, for the mainland, as well as regional data covering the five contiguous administrative regions in the country (NUTS II) - North, Center, Lisbon, Alentejo and Algarve. The data at the aggregate level covers the period 1980-2011, whereas the data at the regional level begin in 1987 due to the lack of regional information for previous years.

Data on output and employment come from the annual issues of the Regional Accounts published by the National Institute of Statistics (INE). The data on investment at the regional level was constructed as the aggregate investment weighted by the regions' output share for the period prior to 2003, as these data are not available from official sources. The figures for the remaining years come also from the Regional Accounts.[2] The data on tourism come from the annual issues of Tourism Statistics, also from the INE. Summary statistics of these variables are provided in Table 3.1.

Table 3.1 - Shares of macroeconomic and touristic variables (% of total)

Regions	Output	Investment	Employment	Tourism
North	30.5	30.5	36.0	12.4
Center	16.5	16.9	20.3	12.7
Lisbon	43.5	42.3	34.4	26.3
Alentejo	5.4	5.8	5.4	4.8
Algarve	4.0	4.5	3.9	43.8
Total	100.0	100.0	100.0	100.0

Source: Annual issues of the Regional Accounts from INE. Own calculation.

Differences in the private-sector macroeconomic variables are significant across regions in Portugal. At a first glance, the data reveal that Lisbon and the North are by far the most important regions. They account for 43.5% and 30.5% of the output, 42.3% and 30.5% of the investment and 34.4% and 36.0% of the employment, respectively. The Center region is ranked third and it accounts for 16.5% of the output, 16.9% of the investment and 20.3% of the employment. The last positions belong to the Alentejo and Algarve which together account for just 9.4% of the output, 10.3% of the investment and 9.3% of the employment.

In terms of tourism, the Algarve emerges as the main touristic region, concentrating, on average, 43.8% of the total number of overnight stays in the country. Lisbon in ranked in the second position, and is followed with a quite large distance by the Center and North regions. The Alentejo region records, on average, 4.8% of the total tourism, and it is ranked in the last position.

[2] Appropriate statistical and econometric analysis did not identify any structural change in the data (results are available upon request).

Information about the origin of tourists is given in Table 3.2. Considering two sub-periods to identify possible trends, we notice that, at the aggregate level, the share of international tourists is systematically higher than the share of domestic tourists. However, the picture at the regional level is mixed. While the North, Center and Alentejo seem to capture the preferences of domestic tourists, the Algarve and Lisbon seem to mimic the national trend.

Table 3.2 – Shares of domestic and international tourists (% of total)

Region/Country	1987-1997		1998-2011	
	Domestic Tourists	International Tourists	Domestic Tourists	International Tourists
Portugal	41.01	58.99	42.60	57.40
North	64.04	35.96	63.29	36.71
Center	73.82	26.18	74.86	25.14
Lisbon	44.46	55.54	36.05	63.95
Alentejo	69.78	30.22	79.48	20.52
Algarve	21.08	78.92	26.42	73.58

Source: Annual issue of Tourism Statistics (2012) from INE. Own calculation.

3.2 Unit-root and cointegration analysis

The order of integration of the variables is identified by the Augmented Dickey-Fuller (ADF) test, while the optimal number of lagged differences in the regressions is determined by the Bayesian Information Criterion (BIC) and the deterministic components are included if statistically significant[3].

The ADF t-tests are firstly applied to aggregate and regional private output, employment, investment and tourism, in log-levels. The results are reported in Table 3.3.

[3] All tests and estimations are performed using the software Rats 6.02.

Table 3.3 - ADF tests to variables in log-levels

Country/Region	Variables	Deterministic components	Order (BIC)	Test statistic	Critical Values	
					5%	1%
Portugal	Output	C	0	-1.09	-2.96	-3.66
	Investment	C	0	-1.22	-2.96	-3.66
	Employment	CT	0	-0.39	-3.56	-4.28
	Tourism	CT	1	-2.65	-3.57	-4.30
North	Output	C	0	-2.64	-2.99	-3.74
	Investment	CT	5	1.29	-3.67	-4.53
	Employment	C	0	-2.03	-2.99	-3.74
	Tourism	CT	2	-2.70	-3.63	-4.44
Center	Output	C	0	-1.03	-2.99	-3.74
	Investment	C	0	-1.98	-2.99	-3.74
	Employment	C	0	-0.69	-2.99	-3.74
	Tourism	CT	0	-2.19	-3.61	-4.39
Lisbon	Output	C	0	-1.77	-2.99	-3.74
	Investment	C	1	-1.36	-3.00	-3.75
	Employment	C	0	-1.69	-2.99	-3.74
	Tourism	CT	0	-2.65	-3.61	-4.39
Alentejo	Output	CT	0	-2.21	-3.61	-4.39
	Investment	C	0	-1.35	-2.99	-3.74
	Employment	C	0	-1.13	-2.99	-3.74
	Tourism	C	0	-2.09	-2.99	-3.74
Algarve	Output	CT	1	-1.33	-3.62	-4.42
	Investment	C	0	-2.98	-2.99	-3.74
	Employment	N	0	1.90	-1.96	-2.66
	Tourism	C	0	-2.52	-2.99	-3.74

Note: Deterministic components: CT stands for "constant and trend", C stands for "constant", and N stands for "none".
Source: Own calculation.

In all cases, the test statistic is higher than the critical values at 1% and 5% levels of significance. Therefore, the null of non-stationarity is not rejected for all variables. The

tests for stationarity of the different variables in growth rates are reported in Table 3.4 and clearly suggest that all variables are I(1)[4].

Table 3.4 - ADF tests to variables in growth rates

Country/Region	Variables	Deterministic components	Order (BIC)	Test statistic	Critical Values	
					5%	1%
Portugal	Output	C	0	-4.04	-2.96	-3.67
	Investment	C	0	-2.91	-2.96	-3.67
	Employment	C	0	-4.40	-2.96	-3.67
	Tourism	C	1	-5.30	-2.97	-3.68
North	Output	C	0	-5.45	-3.00	-3.75
	Investment	C	0	-3.58	-3.00	-3.75
	Employment	C	0	-4.12	-3.00	-3.75
	Tourism	C	0	-6.25	-3.00	-3.75
Center	Output	C	0	-5.18	-3.00	-3.75
	Investment	C	0	-5.17	-3.00	-3.75
	Employment	C	0	-3.64	-3.00	-3.75
	Tourism	C	0	-5.34	-3.00	-3.75
Lisbon	Output	C	0	-4.16	-3.00	-3.75
	Investment	N	0	-2.22	-1.96	-2.67
	Employment	C	0	-4.19	-3.00	-3.75
	Tourism	C	0	-5.84	-3.00	-3.75
Alentejo	Output	C	0	-5.13	-3.00	-3.75
	Investment	C	0	-6.33	-3.00	-3.75
	Employment	C	0	-5.28	-3.00	-3.75
	Tourism	C	0	-6.81	-3.00	-3.75
Algarve	Output	C	0	-5.54	-3.00	-3.75
	Investment	C	0	-4.86	-3.00	-3.75
	Employment	N	0	-3.60	-1.96	-2.67
	Tourism	C	0	-4.40	-3.00	-3.75

Note: Deterministic components: C stands for "constant", and N stands for "none".
Source: Own calculation.

[4] Growth rates are calculated as the first differences of log-levels.

In fact, in almost all cases, the test statistic is below the critical values at 5%, with the only exception of the series of investment for Portugal, in which case the test statistic is clearly below the critical value at 10% level of significance[5]. Given the results, it can be concluded that the null hypothesis of a unit root in growth rates can be rejected for all variables both at the aggregate and regional levels[6].

Once that the variables are I(1), it is relevant to check for the existence of long-run relationships among them, by testing for cointegration both at the aggregate and regional levels. Given the relatively reduced sample size, it is adopted the Engle-Granger procedure, which is less vulnerable than the Johansen procedure to the small sample bias toward finding co-integration when it does not exist (see, for example, Gonzalo and Pitarakis, 1999 and Gonzalo and Lee, 1998).

Following the standard Engle-Granger approach, four tests are performed at the aggregate level and for each region, by considering a different endogenous variable. This is because it is possible that one of the variables enters the co-integrating relationship with a statistically insignificant coefficient and a test that uses such a variable as the endogenous variable will not pick up the cointegration (see, Pereira, 2000). The ADF t-test is then applied to the residuals from the regressions of each variable on the remaining variables. The optimal lag structure is chosen using the BIC. According to the results, reported in Table 3.5, in all cases the values of the test statistic are higher than the 5% or, at least, the 1% critical values. Therefore, the null of no cointegration is not rejected.

[5] The critical level at 10% of significance is -2.63 (Fuller, 1976).
[6] Since the ADF test assumes no structural breaks in the series, the Zivot and Andrews (1992) sequential test procedure for unit roots, in which the break point is estimated endogenously, was also employed. The results (available on request) suggest that all series are I(1) without structural breaks.

Table 3.5 - Engle-Granger test

Country/Region	Variables	Order (BIC)	Test statistic	Critical Values	
				5%	1%
Portugal	Output	1	-3.63	-4.02	-4.77
	Investment	0	-2.84	-4.02	-4.77
	Employment	0	-3.25	-4.02	-4.77
	Tourism	0	-2.97	-4.02	-4.77
North	Output	1	-2.98	-4.10	-4.92
	Investment	0	-2.66	-4.10	-4.92
	Employment	1	-2.33	-4.10	-4.92
	Tourism	0	-3.14	-4.10	-4.92
Center	Output	0	-4.25	-4.10	-4.92
	Investment	0	-0.91	-4.10	-4.92
	Employment	0	-2.57	-4.10	-4.92
	Tourism	0	-5.28	-4.10	-4.92
Lisbon	Output	1	-3.07	-4.10	-4.92
	Investment	1	-2.86	-4.10	-4.92
	Employment	0	-3.00	-4.10	-4.92
	Tourism	2	-3.63	-4.10	-4.92
Alentejo	Output	0	-2.60	-4.10	-4.92
	Investment	0	-3.24	-4.10	-4.92
	Employment	0	-3.89	-4.10	-4.92
	Tourism	0	-4.51	-4.10	-4.92
Algarve	Output	0	-1.74	-4.10	-4.92
	Investment	0	-2.17	-4.10	-4.92
	Employment	0	-2.66	-4.10	-4.92
	Tourism	0	-2.38	-4.10	-4.92

Note: Critical values are from MacKinnon (2010). The different critical values result from the different number of observations used at the national and regional levels.
Source: Own calculation.

CHAPTER 4. METHODOLOGICAL BACKGROUND AND MODEL ESTIMATION

This chapter is devoted to the discussion of the main aspects concerning the measurement of the effects of touristic activity and the determination of the appropriate vector autoregressive models (hereinafter VAR models) specification.

4.1 Methodological background

Given that all variables are I(1), that is, they are stationary in growth rates and that they are not cointegrated, the standard procedure in literature is followed with the estimation of a set of VAR models in growth rates. First, a model for the whole country that includes tourism (GTOUR), in addition to aggregate private-sector variables – output (GGDP), employment (GEMP), and investment (GINV)[7] – is estimated. This estimation is intended to give the overall picture of the effects of tourism in Portugal and to frame the regional decomposition of such effects. Region-specific VAR models with region-specific private-sector variables, as well as tourism in the region, and including an additional variable that reflects touristic activity in the rest of the country, that is, in other regions (GTOURELSE), are then estimated. With these models, the existence of regional spillover effects, for each region, generated by tourism in other regions is fully accounted for. This also means that, for each region, the effects of tourism are estimated, distinguishing between the effects of tourism in the region itself, the direct effects, and the effects of tourism located in other regions, the spillover effects captured by each region.

The vector autoregressive modelling approach was presented in an influential paper of Sims (1980). In this methodology, the variables are modelled as dynamic processes, in which there is no distinction between exogenous and endogenous variables. All variables are considered endogenous. This modelling strategy represented a paradigm shift from the simultaneous equation models very common in 1960s and 1970s that impose a division between endogenous and exogenous variables. In this way, Sims (1980) argued that the restrictions imposed to the parameters could drive to include

[7] The prefix G indicates that all variables are in growth rates.

variables that were not important from an economic point of view, while other relevant variables could be excluded. According to the author, this methodology is distinct from others since there is no *a priori* division between endogenous and exogenous variables, or any other restrictions of nullity on the parameters and since it considers very general theoretical principles it is not restricted by the economic theory. In this sense, the VAR model is suitable for the estimation of dynamic relationships among endogenous variables, without the imposition of any restrictions. The approach of the model consists on the regression of each variable included in the model on lagged values of the variable itself and on other variables' of the model.

In the present study, considering the growth rates of private-sector variables – output (GGDP), employment (GEMP), investment (GINV) and tourism (GTOUR), the general VAR model of order p, denoted by VAR(p) for the country and each region, can be represented by:

$$Y_t = \beta + \sum_{i=1}^{p} \gamma_i Y_{t-1} + u_{t,} \qquad u \sim iid(0, \sum) \tag{1}$$

where Y_t is a column vector (4x1) of observations of current values of all variables; β is a column vector (4x1) of deterministic components; γ_i are (4x4) square matrices of parameters and u_t is a column vector (4x1) of random errors with zero mean, time independent variance and not autocorrelated. However, they are assumed to be contemporaneously correlated; $\sum$ is the matrix of variances/covariances.

The model (1) can be expressed in a matricial form, as follows:

$$\begin{bmatrix} GGDP_t \\ GEMP_t \\ GINV_t \\ GTOUR_t \end{bmatrix} = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \\ \beta_4 \end{bmatrix} + \begin{bmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) & A_{14}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) & A_{24}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) & A_{34}(L) \\ A_{41}(L) & A_{42}(L) & A_{43}(L) & A_{44}(L) \end{bmatrix} \begin{bmatrix} GGDP_{t-1} \\ GEMP_{t-1} \\ GINV_{t-1} \\ GTOUR_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \end{bmatrix}, \tag{2}$$

for *j* and *k* equals to *1,2,3,4*; β_i are (1x2) vectors containing deterministic components (a constant, a time trend or both), $A_{jk}(L)$ are polynomials of order p in the lag operator *L*, whose individual terms are denoted by $A_{jk}(1)$, $A_{jk}(2)$,…, and e_{jt} are independent and identically distributed disturbance terms[8].

[8] The consideration of spatial spillovers with the inclusion of the GTOURELSE variable expands the model by increasing the dimension of the vectors and the γ_i matrices accordingly.

As it is shown above, the VAR model has a different "structure" compared with a simultaneous equation model. Whereas in the VAR approach the economic theory only "suggests" the relevant variables to be included in the model and its order is determined by data, in classic models the economic theory plays a different role. It is important to underline that all variables have the same lag structure and identical integration order. The choice of the appropriate length is crucial to avoid the autocorrelation of the error terms, once this problem can bias the parameters estimation. On the other hand, there is a trade-off between a high number of lags and the number of degrees of freedom. Therefore, to check the appropriate lag length some statistical tests are used, such as the Likelihood Ratio Test, mainly for large samples, and the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC), both for small samples. The BIC is also adopted in estimations, as before, since it is asymptotically consistent and have superior sample properties.

This approach is often referred in the literature as "modern econometric methods" (Dwyer, Forsyth and Papatheodorou, 2011) and it has been used in tourism demand analysis and forecasting (see, for example, Arslanturk and Atan, 2012). It allows highlighting the relevance of dynamic feedbacks among the variables, as well as the possible endogeneity of the touristic variable, and the identification of regional effects of touristic activity in a framework that is consistent with the evaluation of the aggregate effects. This methodology also allows the estimation of the effects of policy shocks on forecasting, as it is stated by Song and Witt (2000). The impulse-response functions associated with the estimated VAR models are then used to calculate the effects of shocks to tourism on the macroeconomic variables at the aggregate and regional levels. In what follows, the methodology considers the effects of one-percentage point in tourism's growth rate and all the dynamic feedback effects among the different variables which in turn are crucial to the estimation of tourism's total effects.

4.2 Conceptual framework

The central issue for the determination of the effects of tourism is the identification of shocks to tourism which are not contemporaneously correlated with shocks in the macroeconomic variables, i.e., shocks that are not subject to the reverse causation

problem. This approach has been used in impact studies such as by Christiano, Eichenbaum and Evans (1996, 1998) and Rudebusch (1998) to analyze the effects of monetary policy and Pereira (2000, 2001) to analyze the effects of public investments.

The econometric counterpart to this idea is to estimate touristic functions, which relate the growth rate of tourism to the information relevant for tourism policy agents, in terms of the growth rates of output, employment and investment. The residuals from these functions reflect the unexpected component of the evolution of tourism and, by definition, are not correlated with innovations in the macroeconomic variables. At the aggregate level it is assumed that the relevant information set includes past but not current values of the macroeconomic variables. This is equivalent to assuming, in the context of the Choleski decomposition, that innovations in tourism affect the macroeconomic variables contemporaneously, while the reverse is not true. Indeed, it is perfectly reasonable to assume that the macroeconomic variables react within a year to innovations in tourism. In fact, touristic activity in each year is reflected in the national accounts of the same year. Positive or negative shocks to tourism have an almost instantaneous impact on employment directly related to tourism industry. They are also susceptible to accelerate or delay investment decisions. It is also reasonable to assume that, due to asymmetric information, delays in tourists' expectations and in their reactions to shocks, tourism is unable to adjust itself to macroeconomic shocks within a year. This same argument justifies the same assumption at the regional level. In this case, it is also assumed that shocks to regional tourism affect regional macroeconomic variables contemporaneously, while the reverse is not true. Finally, in almost all regional models, it is assumed that shocks to tourism outside the region affect contemporaneously shocks to tourism in the region, with the exception of the Algarve. This distinction is justified by the fact that whereas for all the other regions, the share of tourism in any given region is relatively small when compared to the tourism outside, for the Algarve region the share of tourism in the region is relatively quite high. However, in order to assess the robustness of results, all the other possible alternatives in terms of variables ordering within the Choleski decomposition framework are also considered.

Long-term elasticities with respect to tourism are calculated from the estimation of the VAR models and the correspondent impulse-response functions. Long-term is defined as the time horizon over which the growth effects of innovations in tourism disappear. It

is assumed here that long-term corresponds to a horizon of thirty years, but all impulse-response functions converge in shorter periods. These elasticities represent the total percentage-point changes in investment, employment and output for one long-term percentage-point change in tourism.

Long-term marginal products of tourism dynamics are also reported. These figures measure the long-term accumulated change in the macroeconomic variables per one thousand overnight stays of tourists. Each figure is calculated by multiplying the long-term elasticity by the ratio of the respective variable to tourism. This ratio is in the original log-levels of the variables and it is the average ratio for the last ten years of the sample. Therefore, the marginal product values represent the long-term total effects of tourism at the end of the sample and, therefore, they attend the economic context observed at the end of the sample period. Moreover, this option allows one to avoid the influence of the business cycles on the estimates of tourism economic effects.

4.3 VAR models specification and tourism functions estimates

The VAR specification has two jointly determined dimensions - the specification of the deterministic components and the identification of the models' order. Therefore, four alternatives in terms of the VAR specifications are fully considered – no deterministic components, deterministic constant, deterministic constant and trend and the search for the best model up to the second order. The results are reported in Table 4.1. Results suggest that the BIC leads consistently to the selection of first order VAR specifications with constant in all models.

Table 4.1 – Vector autoregressive models specification

Country/Regions	Deterministic components	1st order	2nd order
Portugal	Constant	**-26.49589**	-25.31557
	Constant and trend	-26.41608	-25.28926
North	Constant	**-31.00994**	-30.52774
	Constant and trend	-31.03632	-31.00038
Center	Constant	**-27.35656**	-25.96124
	Constant and trend	-27.08027	-26.68122
Lisbon	Constant	**-29.78869**	-28.00718
	Constant and trend	-28.77614	-29.27460
Alentejo	Constant	**-22.14411**	-19.82826
	Constant and trend	-22.07581	-19.86313
Algarve	Constant	**-26.92271**	-25.53708
	Constant and trend	-25.90408	-26.23534

Note: Selected specifications in bold.
Source: Own calculation.

The correspondent touristic functions at the aggregate and regional levels, in which tourism is the dependent variable, are reported in Table 4.2. At the aggregate level there is no feedback from the private-sector variables to tourism, which suggests that tourism is truly an exogenous variable. This results is not totally surprising since the exogeneity of the touristic variable is shared in the literature by some authors. For instance, Dieke (2011) refers that the demand for tourism is often based on mass-packed tourism promoted from the outside and that demand is usually met through charter flights on scheduled airlines. The earlier study of Weaver (1983) had also confirmed the view that demand in tourism is exogenous and that the host country has no absolute control. Given that international tourists represent the higher share of tourism at national level, this result is not surprising. Furthermore, several other studies reported in the literature review (Chapter 2) did not find causality from output to tourism.

The pattern of the touristic function at the aggregate level also results from a mix of situations at the regional level. In terms of the region-specific functions, tourism is always responsive to previous changes in region-specific private sector variables or to previous changes in tourism within each region or in other regions.

Table 4.2 - Touristic functions (Dependent variable: tourism)

Country/ Regions	C	GGDP(-1)	GEMP(-1)	GINV(-1)	GTOUR(-1)	GTOURELSE(-1)
Portugal	0.02191** (0.011)	-0.11096 (0.363)	0.19884 (0.569)	0.03782 (0.141)	0.00765 (0.213)	--
North	0.08134 (0.063)	-0.06301 (0.481)	0.38481 (1.013)	-0.08969 (0.315)	-0.42890*** (0.141)	0.67837 (0.461)
Center	0.00753 (0.014)	0.05926 (0.321)	-0.27285 (0.243)	0.07919 (0.320)	-0.23132*** (0.079)	0.05194 (0.241)
Lisbon	0.01953 (0.021)	-0.71046* (0.386)	-0.59094 (0.569)	0.43352 (0.391)	-0.08805 (0.277)	0.11805 (0.458)
Alentejo	0.13309*** (0.050)	0.86914* (0.691)	-0.33483 (0.445)	-0.65413 (0.483)	-0.37134*** (0.187)	-2.40774*** (0.933)
Algarve	0.05133*** (0.021)	-0.30174 (0.249)	0.69205** (0.295)	0.04057 (0.121)	-0.11956 (0.186)	0.46025* (0.262)

Notes: C stands for "Constant"; Standard deviations in brackets; * significance at 10%; **significance at 5%;***significance at 1%.
Source: Own calculation.

The analysis that follows considers the effects of one-percent point, one-time innovations in the growth rate of tourism. While it is expected these innovations to have at least temporary effects on the growth rates of the other variables, they will have permanent effects on the levels of those variables. The impulse-response functions associated with the VAR estimates and the touristic functions described above are reported in the Appendix 1.

CHAPTER 5. REGIONAL EFFECTS OF TOURISM

This chapter is composed by several sections where the estimation results and subsequent analysis are fully reported. Firstly, the estimated effects at the aggregate level are presented, as well as the effects at the regional level. Although the aggregate results are not the central results of this research, they are quite informative about the crucial impact of tourism on the country's economic performance. They are also essential to calibrate the estimation of the effects at the regional level within a framework compatible with the occurrence of spillover effects. Secondly, the analysis is complemented with the identification of the regions where the direct and the spillover effects are stronger, the locations of tourism with the highest effects for each region and the regions where tourism generates higher impacts at the national level. Finally, the discussion is closed with the analysis of tourism contribution to the concentration of economic activity which, together with the previous analysis, turns to be informative on the tourism's role to reduce regional asymmetries.

5.1 Effects at the national level

The aggregate results are obtained from the impulse-response functions associated with the VAR model, relating output, employment, private investment and tourism at the national level. These results are reported at the top section of Table 5.1. The elasticity of private investment with respect to tourism is 1.30, which implies that one thousand overnight stays in the country induces, in the long-term, an accumulated increase of € 1,162 million in private investment. Therefore, at the national level, tourism and private investment are complements. In turn, the elasticity of private employment with respect to tourism is 0.26. This implies that one thousand overnight stays creates, in the long-term, about 35 new private-sector jobs. Again, there is a complementary relationship between tourism and employment at the aggregate level. Finally, the elasticity of output with respect to tourism is 0.46. This means that one thousand overnight stays leads to an accumulated long-term increase in private output of € 1,875 million. This result implies an annual rate of return over a thirty-year period of 2.1%. Accordingly, there is also complementarity between tourism and output at the aggregate level.

Table 5.1 - Long-term effects in the absence of regional spillovers

Country/ Region	Investment		Employment		Output	
	Elasticities	Marginal Products	Elasticities	Marginal Products	Elasticities	Marginal Products
Portugal	1.30005	1,16288	0.26278	34.67613	0.45696	1,87474
North	0.43593	0,10890	0.01888	0.82865	-0.04575	-0,05261
Center	1.13086	0,17265	0.73364	19.67671	0.82490	0,54930
Lisbon	0.87759	0,32339	0.54786	24.24062	0.38639	0,69789
Alentejo	0.31251	0,01825	0.04870	0.35683	0.20686	0,04886
Algarve	0.53645	0,02762	0.16878	0.97200	0.09018	0,01724
Total of all regional effects	----------	0,65081	----------	46.07482	----------	1,26068
Total as percentage of national effects	----------	55.9%	----------	132.9%	----------	67.2%

Source: Own calculation.

5.2 The national effects versus the aggregation of regional effects

Comparing the results of the aggregate level with the sum of the results from the regional models raises several issues which should be addressed. The existence of general equilibrium effects that occur at the national level may not be fully captured at the regional level. It is perfectly plausible that the sum of the estimated regional marginal products would not coincide with the effects at the national level. Let´s consider, for example, the effects of tourism on decisions regarding private factors demand. When there is an increase/decrease of tourism (e.g. the number of overnight stays), greater/lower factor quantities are demanded, simultaneously, in all regions. The simultaneous increase in factor demand is limited by restrictions in the economy, whereas the simultaneous decrease in factor demand leads to resources unemployment and economic inefficiency. As a result, a part of the increase/decrease in demand translates into increases/decreases in factor prices which in turn lowers/increases demand in various regions. However, each region by itself does not have enough weight to drive price changes and therefore it is expected that the sum of the regional marginal products will not be in line with the aggregate effects. In fact, estimation results show

that the sum across regions of the effects of tourism represents 55.9%, 132.9%, and 67.2% of the estimated aggregate results for private investment, employment and output, respectively. In light of the previous discussion, these values suggest that general equilibrium effects are relevant for all private-sector variables.

5.3 The regional decomposition of the effects of tourism

The effects of tourism at the regional level are now considered through the impulse-response functions associated with the region-specific VAR models, which include region-specific private-sector variables and tourism in the region as well as tourism elsewhere in the country (it should be understood as tourism in the other regions). With this additional variable it is possible to distinguish the effects for each region of tourism in the region itself, i.e., the direct effects, as well as the effects of tourism located in the other regions, i.e., the spillover effects. The total effect for each region of tourism in the country will then be given by the sum for each region of the direct effect and the spillover effect.

Accordingly, in what follows, the raw marginal products are multiplied by the average ratio between regional tourism and total tourism in the country over the sample period. In this way, all regional marginal products reflect the effects for each region of one thousand overnight stays in the country. The results are reported in Table 5.2.

The results are now more in line with the results from the aggregate model. The sum across regions of the direct effects and spillover effects correspond to the overall aggregate effects of tourism in the country. The aggregate effects that emerge from the regional models are 82.9%, 119.2% and 100.4% of the effects estimated with the aggregate model for investment, employment and output, respectively (in totals, column 3).

Table 5.2 - National and regional effects of tourism

Country/Regions	Elasticities with respect to		Marginal Products with respect to		
	Tourism in the region	Tourism in other regions	Tourism in the region (1)	Tourism in other regions (2)	Total (3)=(1+2)
Effects on Private Investment					
Portugal	1.30005 [0.077; 1.436]		1,16293		
North	0.14284 [0.113; 0.164]	1.07442 [0.619; 1.095]	0,03563	0,04582	0,08151
Center	1.25559 [0.489; 1.274]	-0.28889 [-0.328; 0.331]	0,19174	-0,00863	0,18310
Lisbon	0.74378 [0.425; 1.023]	1.41769 [0.721; 1.592]	0,27410	0,23141	0,50552
Alentejo	0.68604 [0.248; 0.692]	-0.22267 [-0.880; 0.054]	0,04012	-0,00085	0,03934
Algarve	0.34752 [0.165; 0.348]	2.01174 [1.329; 2.042]	0,01793	0,13662	0,15453
Total of all regions as a % of the aggregate	---------	---------	0,5594 58.0%	0,4044 42.0%	0,9638 82.9%
Effects on Employment					
Portugal	0.26279 [0.084; 0.328]		34.6761		
North	-0.03071 [-0.122; -0.031]	0.18675 [-0.012; 0.193]	-1.34763	1.39962	0.05200
Center	0.72333 [0.149; 0.733]	-0.45851 [-0.466;- 0.441]	19.40013	-2.38773	17.01243
Lisbon	0.28202 [0.062; 0.467]	0.28567 [0.034; 0.396]	12.47832	5.63431	18.11265
Alentejo	0.21311 [0.084; 0.226]	-0.15225 [-0.277;-0.009]	1.56124	-0.06632	1.49493
Algarve	-0.00233 [-0.208; 0.019]	0.61411 [0.579; 0.674]	-0.01343	4.67590	4.66252
Total of all regions as a % of the aggregate	---------	---------	32.0786 77.6%	9.2558 22.4%	41.3343 119.2%

Table 5.2 - National and regional effects of tourism (cont.)

Country/Regions	Elasticities with respect to		Marginal Products with respect to		
	Tourism in the region	Tourism in other regions	Tourism in the region (1)	Tourism in other regions (2)	Total (3)=(1+2)
Effects on Output					
Portugal	0.45697 [0.308; 0.461]		1,87472		
North	0.16142 [0.027; 0.295]	0.24440 [0.081; 0.247]	0,18563	0,04812	0,23373
Center	0.76785 [0.383; 0.768]	-0.92626 [-0.926; -0.305]	0,51131	-0,12013	0,39122
Lisbon	0.36867 [0.244; 0.402]	0.43251 [0.352; 0.509]	0,66592	0,34744	1,01334
Alentejo	0.42232 [0.185; 0.439]	-0.11352 [-0.739; -0.106]	0,09974	-0,00161	0,09820
Algarve	0.03685 [0.022; 0.078]	0.55311 [0.495; 0.604]	0,00701	0,13932	0,14632
Total of all regions as a % of the aggregate	---------	---------	1,4695 78.1%	0,4131 21.9%	1,8827 100.4%

Note: Results from all variable's ordering alternatives in square brackets.
Source: Own calculation.

In terms of private investment, tourism in the region has positive effects in all regions and, therefore, tourism in the region crowds-in private investment at the regional level. In terms of the marginal products, our estimates suggest that one thousand overnight stays generate, in the long-term, a net increase in private investment of € 0,559 million, Lisbon being the region that captures the bulk of this effect, followed by the Center. In turn, tourism elsewhere affects regional private investment positively in almost all regions, with the exceptions of the Center and Alentejo, whose effects are only marginally different from zero. Our estimates suggest that one thousand overnight stays generate, in the long term, spillover effects around € 0,404 million, the largest marginal products being for Lisbon again and Algarve, the two main touristic regions in the country. Finally, the total effect, i.e., the sum for each region of the direct and spillover

effects, is positive in all regions. The largest effect occurs in Lisbon, with a marginal product of € 0,506 million. The effects for the Center and Algarve are less significant with marginal products of € 0,183 million and € 0,155 million, respectively. Finally, the marginal products for the North and Alentejo regions are negligible.

In terms of employment, tourism in the region has positive effects in three regions, the exceptions being the North and Algarve. The results suggest that one thousand overnight stays in the region create, in the long term, 33.4 private jobs. Of these, 32.1 are new jobs, while the remaining 1.3 correspond to jobs shifted across regions.

The Center and Lisbon are the regions that benefit the most from tourism in the region. Tourism elsewhere affects regional employment positively in three regions: Lisbon once again, Algarve and North. In what concerns to spillover effects, the results suggest that one thousand overnight stays elsewhere generate, in the long term, spillover effects of about 9.3 new private jobs. The bulk of the effects occur in Lisbon with 5.6 new jobs and Algarve with 4.7 new jobs. However, the total effect is positive in the remaining regions, although very marginal in the North.

Finally, output is positively affected by tourism in the region in all five regions. Therefore, tourism and output are also complements at the regional level. In terms of marginal products, the overall long-term accumulated gain is € 1,470 million, with Lisbon and the Center being the regions which capture the greatest effects. In addition, regional output is affected positively by tourism elsewhere in three of the five regions, the exceptions being the Center and Alentejo, the latter with an effect which is only marginally different from zero. One thousand overnight stays generate spillover effects that amount to € 0,413 million in the long-term, Lisbon being the region that captures the largest marginal product, and it is followed with a large distance by the Algarve with € 0,139 million. Finally, the total effects are positive for all regions. Once again, the regions with the highest total marginal products are Lisbon and the Center with € 1,013 and € 0,391 million, respectively.

These results deserve a cautious thought. On one hand, tourism generates important positive macroeconomic effects on the whole country. On the other hand, those effects are not equally distributed among regions. Lisbon and the Center seem to be the great beneficiaries in all variables and they are closely followed by the Algarve and North. The Alentejo seems to be the region with lowest impacts in all variables, in particular in

investment and output. These results are in line with the importance of these regions in terms of tourism and in terms of facilities and accommodation infrastructures. The higher effects are observed in those regions with a long tradition in the touristic sector like the Algarve and regions were tourism has had a high expansion over the last years such as Lisbon, North and Center. While the North has increased its importance in international and domestic markets due to the growing interest in the Oporto's wine route or the recent low-cost flights, the major attraction in the Center is religious and mountain tourism. Lisbon has a more diversified touristic product, that ranges from cultural to business tourism and it accounts with the main international airport and an important harbor with capacity to receive large cruise ships. The tourism in the Algarve is mainly oriented to the very specific market of "sun and beach".

The highest effects captured by Lisbon are certainly not independent from the fact that the region concentrates a significant part of the country's economic activity, being the elected location for the headquarters of national and multinational enterprises. Nevertheless, the relatively lower effects for the Algarve cannot be disassociated from the high concentration of tourism facilities located in this region which, in some periods, and due to the high degree of seasonality that characterizes the tourist's motivation who choose this region for holidays, are not efficiently used. Moreover, being this region a matured destination it is not far from "a stage of stagnation" and therefore it needs to rejuvenate (Butler, 1980). Sometimes, destinations in this stage become less attractive and drive to attracting "lower quality" tourists. Therefore, the lower effects for the region of Algarve are probably a consequence of the decreasing marginal returns law. Tourism in Alentejo has not been object of relevant investments in infrastructures and only the investments in the recently inaugurated airport and the investments in the region of Alqueva have given some dynamics to this region.

Finally, a last note about the central results' robustness. In the base scenario, shocks to tourism in a region affect contemporaneously regional private-sector variables while the reverse is not true. They also do not affect contemporaneously tourism elsewhere, with the exception of shocks to tourism in the Algarve. Although these assumptions seem to be more reliable from an economic perspective, other identification orderings should be addressed. Table 5.2 also reports the range of results for the elasticities considering all possible orderings in the national and region-specific models. The results (in square brackets) suggest that, in general, the range of variation is not large and in most cases

the central results lie in the middle of the variation range. Additionally, in most cases, the elasticities' sign does not change with the identification ordering. This gives a strong indication of the results robustness.

5.4 The regional incidence of the spillover effects

To determine the importance of the regional spillover effects it is relevant to calculate how much of the total effect of tourism in the country and in each region is due to direct effects and how much is due to spillover effects. The results are reported in Table 5.3.

In terms of the effects on regional private investment, of the total marginal product of € 0,964 million, the direct effects correspond to € 0,559 million and the spillover effects to € 0,404 million, or 42.0% of the total effects. Furthermore, the spillover effects are more important than the direct effects for two of the five regions, namely the Algarve and North, representing 88.4% and 56.2% of the total effects, respectively. In Lisbon, the spillover effects are lower than the direct effects but they are significant as they represent 45.8% of the total effects captured by the region. As to the effects on regional employment, of the total effects of 41.33 new jobs, the direct effects correspond to 32.1 and the spillover effects to 9.26, or 22.4%. Once again, these spillovers are more important than the direct effect in the Algarve and North, representing 100.3% and 2,691.5% of the total effects, respectively. Once again, in Lisbon the spillover effects are not higher than the direct effects but are significant, representing 31.1% of the total effects. Finally, in terms of the effects on regional output, the direct effects account for € 1,470 million of a total of € 1,883 million, while the spillovers correspond to the remaining € 0,413 million or 21.9% of the total. At the regional level, one can observe that spillovers are more important than direct effects only in the Algarve, where they represent 95.2% of the total effects on output captured by the region. The spillover effects in Lisbon and North represent 34.3% and 20.6% of the total effects, respectively. In conclusion, the results show that for the Algarve and North the spillover effects are more important than the direct effects in all variables, with exception in output for the North. Lisbon captures effects from tourism in other regions, which are significant but lower than the direct effects. Finally, the regions of Alentejo and Center do not benefit from spillovers in any variable.

Table 5.3 - The importance for each region of spillover effects of tourism

Country/Regions	Private Investment	Employment	Output
Portugal	42.0%	22.4%	21.9%
North	56.2%	2,691.5%	20.6%
Center	0%	0%	0%
Lisbon	45.8%	31.1%	34.3%
Alentejo	0%	0%	0%
Algarve	88.4%	100.3%	95.2%

Note: Spillovers are measured as a fraction of total effects of tourism both in the region and elsewhere. Value 0% if numerator is negative.
Source: Own calculation.

The results seem to suggest the existence of important economic relations and touristic flows between the regions of Algarve, North and Lisbon and the rest of the country. The portrait of regions' tourism specialization described in the previous section can also help to understand the geographical pattern of the spillover effects. The results may configure a situation in which tourists located in one region often take the opportunity to visit the Algarve, the North and Lisbon. By the contrary, the decision of visiting Alentejo or the Center by tourists located in other regions does not seem to be relevant. This might be explained by the specific motivations for visiting these regions. Religious motivations are dominant for those visiting the Center region. Also, the motivations of tourists visiting the Alentejo are mainly driven by the search of "sun and beach" (similar to the touristic product of Algarve) along with the search of peace and quiet which are not easily found in other regions. These arguments may explain the fact that those regions benefit exclusively from tourism located inside their boundaries.

5.5 Tourism, economic growth and regional asymmetries

Given the results of the previous section which are quite informative about the effects captured by each region from tourism located in the region and tourism located elsewhere in the country, it is interesting to look now at another perspective which may be very informative for the decision process regarding the policy design for the touristic sector. On one hand, it is important to know whether tourism in the region or outside is more advantageous for each region. To accomplish this objective, the relative effects, in each variable, and for each region, of tourism in the region and tourism elsewhere in the

country are fully considered. On the other hand, it is important to identify the regions in which tourism generates higher impacts at the national level. To accomplish this issue, the effects for the whole country of tourism in any given region, i.e., both the effects induced in the region and the effects induced in the other regions, are considered.

5.5.1 The relative effects for each region of tourism in the region and elsewhere

The effects for each region of one thousand overnight stays in the region and one thousand overnight stays elsewhere are now considered. The relevant results are reported in Table 5.4.

Table 5.4 - Effects of tourism in the region and elsewhere in the country (*)

Regions	Private Investment		Employment(**)		Output	
	Tourism in the region	Tourism elsewhere	Tourism in the region	Tourism elsewhere	Tourism in the region	Tourism elsewhere
North	0,2893	0,3255	-10.9232	9.9384	1,5047	0,3413
Center	1,5289	-0,0596	154.731	-16.5961	3,6703	-0,8348
Lisbon	1,0335	0,6382	47.055	15.5377	2,5110	0,9581
Alentejo	0,8405	-0,0155	32.7486	1.3231	2,0923	-0,0318
Algarve	0,0408	0,1739	-0.0306	5.9547	0,0161	0,1739

Note: (*) The values are marginal products. They are not weighted values. They measure the effect, in the long-term, of one thousand overnight stays in each region and outside the region.
(**) The marginal products represent the minimum number of jobs generated by a thousand of overnight stays in each region and outside the region.
Source: Own calculation.

Considering the effects of tourism on regional private investment, the regions of Lisbon and Center benefit the most from tourism in the region itself, followed by the Alentejo, with marginal products of € 1,033, € 1,528 and € 0,841 million, respectively. Lisbon is also the region that benefits the most from tourism elsewhere, with a marginal product of € 0,638 million, followed by the North and Algarve with marginal products of € 0,326 and € 0,174 million, respectively. The remaining regions receive negative effects. According to these results, a greater stimulus to private investment in the North and Algarve is attained by promoting tourism outside these regions, while the stimulus to private investment in Lisbon, Alentejo and Center is attained with policies towards the promotion of tourism in each region.

Considering the effects of tourism on regional employment, the regions that benefit the most are again the Center and Lisbon, closely followed by the Alentejo. For these regions, a thousand overnight stays in the region itself create, in the long term, about 154.7, 47.1 and 32.7 new jobs, respectively. At the same time, all regions, with the exception of the Center, capture positive effects from tourism elsewhere. One thousand overnight stays outside these regions create, in the long term, 15.5 jobs in Lisbon, 9.9 in the North and 5.9 new regional jobs in the Algarve. The Alentejo gets marginal effects from tourism elsewhere. Accordingly, in order to stimulate regional employment, the North and the Algarve would lobby for touristic promotion elsewhere, whereas the Center, Lisbon and Alentejo would lobby for tourism promotion in each region.

Finally, regarding the effects on regional output, all regions benefit strongly from tourism in the region itself, with the exception of Algarve whose effects are much lower. The estimated marginal products are € 3,670, € 2,511, € 2,092 and € 1,505 million for the Center, Lisbon, Alentejo and North, respectively. In turn, Lisbon and the North continue to show a substantial effect on output from tourism elsewhere, although it is lower than the effects from tourism inside each region. In terms of output effects, almost all regions, with the exception of the Algarve, benefit more from tourism in the region itself and therefore, all those regions would want to lobby for the design of policies directed to the promotion of tourism in the region itself than in the country in general.

5.5.2 National effects from tourism in any given region

Since tourism in any given region affects economic performance in other regions and since each region benefits from tourism in the region and elsewhere, it is important to know in which locations tourism has the greatest effects for the whole country. This is a relevant issue given the strategic importance tourism has traditionally assumed for the country's economic development. This analysis also makes possible to drive conclusions on whether the contribution of tourism to the country’s economic growth is compatible with the reduction of regional asymmetries, that is, whether the greatest impacts are generated by tourism located in economically less favourable regions. The relevant results are reported in Table 5.5.

In terms of the effects on national private investment, tourism in the Center generates the largest benefits with a marginal product of € 2,651 million, reflecting mostly strong direct regional effects. The Alentejo is the other region where tourism generates high benefits at the national level with a marginal product of € 1,919 million, reflecting mostly spillover effects. Lisbon is the other region where the benefits from tourism are large, specifically € 1,458 million, reflecting mostly direct effects. For the other regions the marginal products are € 1,026 and € 0,924 million for the North and Algarve, respectively and reflect mostly important spillover effects. As to national employment, tourism in the Center generates the larger results with 187.49 new long-term jobs for each thousand overnight stays, due to a large extent to significant direct regional effects. Lisbon and Alentejo show results of comparable magnitude of about 47 new jobs per one thousand of overnight stays and also reflect strong direct effects. The Algarve reports 10.17 new jobs per one thousand of overnight stays, mostly due to spillover effects, whereas the effect for the North is actually negative due to negative regional direct effects. Finally, in terms of output, tourism in the Center generates the largest effects with a marginal product of € 5,112 million, mostly due to important direct regional effects. Alentejo and Lisbon are ranked second and third, respectively, with € 2,731 and € 2,160 million, also due again to direct regional effects. The North is ranked fourth with € 1,770 million, also due to direct effects. The Algarve shows much lower effects, but a much larger contribution of the spillover effects.

It seems that tourism in the Center and Alentejo generates the largest marginal benefits in terms of the economic performance for the country as a whole and most of the benefits tend to be located within the regions. This means that tourism in these regions contributes to the country's economic development and simultaneously reduces the gap between these regions and the two-top regions of Lisbon and North. Lisbon is another region with important impacts at the national level but also capture most of the effects. Accordingly, tourism in Lisbon, while contributing to the country's economic growth, also contributes to the macrocephaly of the country. In turn, for the North and Algarve, while the contributions to the country are lower, these regions generate important spillovers. These results may suggest that tourism in the North and Algarve also contributes to other regions economic development and therefore to reduce regional asymmetries. In conclusion, this pattern highlights the possibility of implementing

policies towards tourism promotion that simultaneously maximize aggregate growth and reduce regional disparities.

Table 5.5 - Nationwide effects of tourism in each region [*]

Regions	Effects in the region (1)	Effects in other regions (2)	Total effects in the country (3) = (1)+(2)
Effects on Private Investment			
North	0,2893	0,7370	1,0263
Center	1,5289	1,1221	2,6510
Lisbon	1,0335	0,4243	1,4578
Alentejo	0,8405	1,0780	1,9185
Algarve	0,0408	0,8886	0,9294
Effects on Employment[**]			
North	-10.9232	6.2194	-4.7038
Center	154.7311	32.7539	187.4850
Lisbon	47.0550	0.6201	47.6751
Alentejo	32.7486	14.8347	47.5833
Algarve	-0.0306	10.2031	10.1725
Effects on Output			
North	1,5047	0,2654	1,7701
Center	3,6703	1,4415	5,1118
Lisbon	2,5110	-0,3514	2,1596
Alentejo	2,0923	0,6385	2,7308
Algarve	0,0161	0,4328	0,4489

Notes: [*] The values are marginal products. They represent the effects of tourism located in each region.
[**] The values represent the number of jobs created by tourism located in each region.
Source: Own calculation.

5.5.3 Tourism and the concentration of economic activity

According to previous results two aspects should be underlined. First, some regions benefit from tourism in a disproportionate manner in the sense that their share of the benefits in each variable clearly exceeds their share of the corresponding private-sector variable. For example, the two regions that benefit the most in terms of the effects of tourism on private investment, employment and output, Lisbon and Center, capture

together 71.4%, 85.0%, and 74.6%, respectively, of such effects (see Table 5.2, column 3). Nevertheless, together, they represent no more than 59.2%, 54.7%, and 60.0%, of the national private investment, employment, and output, respectively (see Table 3.1). In this sense, tourism has contributed to the concentration of economic activity in these regions. Second, these regions that benefit the most from tourism are also two of the largest regions in the country in all variables. This suggests that tourism not only has increased the concentration of private economic activity but also has done so mostly in some of the largest regions.

These issues are now explicitly considered. In particular, it is important to identify which regions benefit the most from tourism in relative terms, that is, relatively to their size. Table 5.6 reports, for all regions, the ratio of the tourism effects size, as measured by its share of the total effects, to the size of the region, as measured by its share of the country's private-sector variable in question. Regarding the relative importance of the effects of tourism on private investment, the greatest beneficiaries are the Algarve, Lisbon and Center. These three regions are also the top-three regions in terms of the absolute effects on private investment. This group also includes two of the top-three regions in terms of their share on the country's private investment, the North and Center. In terms of the relative importance of the effects of tourism on private employment, the greatest beneficiaries are again Lisbon, Algarve and Center. This group consists on the top-three regions in terms of the effects of tourism on private employment. It is also composed by the three most important regions in terms of their share on the country's tourism. Finally, in terms of the relative importance of the effects on private output, this same group of regions benefits disproportionately to their size.

These results show that the Algarve, Lisbon and Center benefit in excess to their size in terms of all three private-sector variables while the North, the most important region in terms of employment and the second most important region in terms of the other variables, capture benefits systematically below its size.

On the basis of the differences in the relative regional benefits could be the differences of each region's share of tourism. Therefore, the relatively large gains captured by some regions could just be a consequence of a disproportionately large tourism in these regions. In this case, while the effects captured by a region would be disproportionate to the region's share of the private-sector variable, they would not be disproportionate to

the region's share of tourism. This perspective brings a new light into the issue of the impact of tourism on regional asymmetries in the country.

Table 5.6: Effects of tourism relative to the regions' size

Regions	Private investment		Employment		Output	
	Perc. of effects/perc. of region private investment	Perc. of effects/perc. of region tourism	Perc. of effects/perc. of region employment	Perc. of effects/perc. of region tourism	Perc. of effects/perc. of region output	Perc. of effects/perc. of region tourism
North	0.277	0.682	0.004	0.010	0.407	1.001
Center	1.124	1.495	2.028	3.241	1.259	1.636
Lisbon	1.240	1.994	1.274	1.666	1.237	2.046
Alentejo	0.703	0.850	0.670	0.754	0.967	1.088
Algarve	3.562	0.366	2.892	0.258	1.943	0.177

Note: Values greater than one reflect effects proportionally greater than the region's share.
Source: Own calculation.

A closer look at Table 5.6 leads to some important conclusions. In terms of the effects of tourism on private investment, Lisbon and the Center benefit disproportionately more than their share of the nation's private investment and they also benefit more than proportionately to their share of tourism. The Algarve region which also benefits relatively more in terms of its share of private investment, actually benefits less than proportionally to its share of tourism. Finally, the remaining regions, the North and Alentejo which benefit less than proportionally to their share of private investment, also benefit substantially less than proportionally to their share of tourism. Clearly, from this standpoint, the big winners in terms of the benefits in private investment are Lisbon and the Center, which are ranked first and third in their share of the nation's private investment, respectively. From this point of view it is clear that the high effects for the Algarve are mostly due to the region´s large share in tourism. In terms of private employment and output, the picture is similar. Again, Lisbon, Center and Algarve benefit more than proportionally to their share in the country's private employment, but only the former two regions benefit more than proportionally to their share of tourism.

It is clear, therefore, that the regions that benefit more than proportionally to their share of tourism and in every private-sector variable are Lisbon and the Center. Lisbon is the largest region in terms of its share of all private-sector variables, while the Center is the third largest region. These results taken together imply that tourism has had a double effect. On one hand, it has contributed to the concentration of economic activity in Lisbon, and from this perspective it has contributed to increase regional discrepancies between the largest economic region of the country and the other regions. On the other hand, the results for the Center region suggest that tourism activity has also contributed to reduce the gap between this region and the top-two regions of Lisbon and North. The North and Alentejo seem to be the big losers. They benefit the least in terms of all private-sector variables proportionally to either their share of the private-sector variable or tourism, with the exception of the proportion of benefits in output to their share in the nation's tourism. The case the Algarve is mixed in that it benefits more than its share of the private-sector variables but substantially less than its share of tourism. This suggests that tourism in the last two decades has had some impacts on closing the gap between some regions, but it has also contributed to increase the gap between the Alentejo and the rest of the country.

6. CONCLUSIONS, POLICY IMPLICATIONS AND FUTURE RESEARCH

This dissertation reports the estimates of the effects of tourism activity, measured by the number of overnight stays of domestic and international tourists in hotels, apartment hotels, tourist apartments, tourist villages, motels, bed & breakfasts inns, guesthouses and camping parks, on the country's economic performance, considering private-sector variables – investment, employment and output. The ultimate objective is determining tourism regional effects and assess whether they are evenly distributed across the five contiguous NUTS II regions of the mainland – North, Center, Lisbon, Alentejo and Algarve. This analysis is also intended to shed light on the issue of regional asymmetries and regional concentration of the economic activity in the country.

The methodology is based on the estimation of separate vector autoregressive models for Portugal and for each of the five contiguous NUTS II regions, which relate private investment, private employment, private output and tourism. The regional models, in addition to tourism inside the region itself, also include tourism in the other regions of the country. This framework makes possible the estimation of the effects for each region of tourism in the region itself, e.g. the direct effects, as well as the effects of tourism in the other regions, e.g. the spillover effects, accounting for the dynamic and feedback effects among all variables.

The empirical results highlight some important facts of tourism activity in Portugal. First, tourism development crowds-in private-sector variables at the national level and, therefore, it has been a strategic sector to promote long-term growth. It is estimated that one thousand overnight stays induce, in the long term, an accumulated increase of € 1,162 million in private investment and create about 35 new private-sector jobs. These results are in line with the estimated positive impact on output. In fact, tourism also crowds in private output as it is estimated that one thousand overnight stays lead to an accumulated long-term increase in private output of € 1,875 million, which corresponds to an annual rate of return, over a thirty-year period, of 2.1%.

Second, the results suggest the existence of strong regional spillover effects. In fact, the estimation of regional models relating regional private-sector variables and regional tourism fails to replicate the aggregate effects. However, the estimation of region-specific models including, in addition to the previous variables, tourism elsewhere in

the country successfully captures the aggregate effects and constitutes evidence that the existence of spillover effects should not be ignored in regional analysis. In particular, spillover effects correspond to 42.0% of the effects in private investment, 22.4% of the effects in employment and 21.9% of the effects in output.

Third, the effects are not equally distributed among regions. The greatest beneficiaries are Lisbon and the Center and these regions are closely followed by the Algarve and North. The Alentejo gets the lowest impacts in all variables.

Fourth, regions benefit differently from tourism located in the region and tourism located elsewhere in the country. In general, the geographic pattern that emerges from the results is that the direct effects are more important in the central regions of the country – Center and Alentejo, while spillovers are more important in the northern and southern regions of North and Algarve, respectively. They are also relevant for Lisbon. Given the relatively short distances among regions and the tourists' motivations, these results seem to suggest the existence of important economic relations and touristic flows between the regions of Algarve, North, Lisbon and the rest of the country. Tourists located in each region take the opportunity to make short visits to those regions.

Fifth, the results also generate important policy implications for future decisions regarding touristic promotion. They suggest that private investment and job creation in the regions of the Algarve and North benefit largely from tourism promotion in the country, while in terms of the effects on output, almost all regions would be better off by lobbying for tourism promotion in the region itself, with the exception of the Algarve.

Sixth, tourism in all regions contributes to the country's economic performance. However, while tourism in the Center and Alentejo also contributes to reduce the gap between these regions and the rest of the country, tourism in Lisbon strengths the macrocephaly of the country.

Seventh, the results suggest that tourism has contributed to the concentration of economic activity in Lisbon and Center. These regions, taken together, capture most of the effects of tourism in all private-sector variables, and they are two of the largest regions in the country in all variables as well. This suggests that tourism activity has contributed to reduce the gap between the Center region and the top-two regions of

Lisbon and North. The North and Alentejo regions get benefits consistently lower than their size, while the benefits captured by the Algarve are mostly due to the large regional share in tourism. This suggests that tourism in the last two decades has had some impacts on closing the gap between some regions, but it has also contributed to increase the gap between the Alentejo and the rest of the country.

To conclude, although this research establishes relevant results of the regional impact of tourism, addressing the issues of regional asymmetries and national economic growth, further research is due in order to complement these results. In particular, it is relevant to check in what extent the estimated effects, here reported, depend from the tourists' origins. More specifically, checking whether the impacts of domestic tourism are different from the impacts of international tourism is relevant for future tourism promotion actions and it is also important to redefine the target markets of future promotion initiatives. Another possible extension of this research is the disaggregation of the effects by types of tourism, distinguishing tourists by type of accommodation. On another vein, the real importance of regional spillovers will be further explored by using spatial information and differentiating between contiguous and non-contiguous regions. Another dimension to be explored is to identify the regions where the spillover effects captured by each region are effectively generated. On the macroeconomic level, another stream of research will deal with the fiscal and budgetary effects of tourism and its effects on the external trade balance. These issues are of particular relevance in the actual context in which the Portuguese authorities are looking for new financing tools to guarantee the continuous deficit reduction in order to improve the country's image in the international financial markets.

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ANNEXES

Annex A – Databases

Table A.1 – Output at national and regional levels

Years	Portugal	North	Center	Lisbon	Alentejo	Algarve
1980	73.181					
1981	74.385					
1982	75.961					
1983	75.830					
1984	74.387					
1985	76.506					
1986	79.641					
1987	84.717	26.086	11.364	41.799	3.225	2.243
1988	91.029	29.329	12.253	43.134	3.430	2.883
1989	95.697	31.494	12.535	45.290	3.507	2.870
1990	99.806	31.322	14.474	45.066	5.210	3.734
1991	102.106	32.135	14.498	46.789	4.825	3.859
1992	104.593	33.669	15.481	46.674	4.669	4.099
1993	103.413	33.442	15.182	46.229	4.671	3.889
1994	105.684	34.508	15.969	46.649	4.739	3.820
1995	108.167	33.960	15.870	49.327	5.048	3.963
1996	111.395	34.983	16.293	50.856	5.186	4.077
1997	115.881	35.750	16.726	53.783	5.345	4.276
1998	119.895	36.614	17.195	56.347	5.305	4.434
1999	115.675	35.346	16.584	54.331	5.130	4.285
2000	123.887	37.757	17.895	58.175	5.366	4.693
2001	132.012	39.773	19.405	61.952	5.687	5.194
2002	137.623	41.003	20.220	64.738	5.995	5.667
2003	139.606	41.609	20.717	65.192	6.201	5.887
2004	149.384	43.651	30.071	58.228	10.651	6.782
2005	150.547	44.108	29.973	58.896	10.632	6.937
2006	152.428	44.593	30.333	59.470	10.929	7.102
2007	156.232	46.081	30.872	60.944	11.001	7.335
2008	156.001	46.420	30.326	61.155	10.784	7.316
2009	151.333	44.776	29.749	59.698	10.242	6.869
2010	154.328	46.038	30.184	60.615	10.608	6.884
2011	152.416	45.771	29.742	59.778	10.399	6.725

Units: Millions of constant 2006 euros.
Source: National Institute of Statistics. Own calculation.

Table A.2 – Investment at national and regional levels

Years	Portugal	North	Center	Lisbon	Alentejo	Algarve
1980	15.751					
1981	16.677					
1982	16.933					
1983	15.767					
1984	13.065					
1985	12.664					
1986	14.020					
1987	16.364	5.039	2.195	8.074	623	433
1988	18.964	6.110	2.553	8.986	715	601
1989	19.783	6.511	2.591	9.363	725	593
1990	21.405	6.718	3.104	9.665	1.117	801
1991	22.157	6.973	3.146	10.153	1.047	837
1992	23.234	7.479	3.439	10.368	1.037	910
1993	21.916	7.087	3.217	9.797	990	824
1994	22.625	7.387	3.419	9.987	1.014	818
1995	23.719	7.447	3.480	10.817	1.107	869
1996	24.632	7.735	3.603	11.245	1.147	902
1997	27.784	8.572	4.010	12.895	1.282	1.025
1998	30.108	9.195	4.318	14.150	1.332	1.114
1999	33.090	10.111	4.744	15.542	1.467	1.226
2000	34.836	10.617	5.032	16.359	1.509	1.320
2001	35.192	10.603	5.173	16.515	1.516	1.385
2002	34.448	10.263	5.061	16.204	1.500	1.418
2003	31.150	9.284	4.623	14.546	1.384	1.313
2004	33.863	9.097	7.572	12.289	2.934	1.971
2005	33.498	9.563	7.384	11.924	2.653	1.975
2006	33.915	9.663	7.373	12.398	2.363	2.119
2007	34.807	10.399	7.407	11.890	2.611	2.500
2008	34.682	10.752	7.292	12.020	2.407	2.211
2009	31.593	9.472	6.272	11.461	2.691	1.698
2010	30.707	9.411	6.187	10.834	2.727	1.548
2011	27.478	8.304	5.203	9.633	2.862	1.476

Units: Millions of constant 2006 euros.
Source: National Institute of Statistics. Own calculation.

Table A.3 – Employment at national and regional levels

Years	Portugal	North	Center	Lisbon	Alentejo	Algarve
1980	3.769					
1981	3.765					
1982	3.790					
1983	3.706					
1984	3.763					
1985	3.758					
1986	3.727					
1987	3.829	1.441	705	1.403	176	104
1988	3.915	1.497	714	1.407	182	116
1989	4.049	1.543	727	1.469	185	124
1990	4.090	1.493	774	1.475	189	160
1991	4.140	1.505	768	1.513	193	161
1992	4.162	1.497	763	1.545	192	165
1993	4.098	1.492	731	1.526	191	158
1994	4.250	1.557	762	1.575	197	159
1995	4.195	1.538	740	1.561	199	157
1996	4.222	1.545	741	1.577	200	159
1997	4.306	1.589	757	1.599	203	158
1998	4.506	1.644	792	1.688	216	166
1999	4.600	1.664	818	1.724	220	173
2000	4.680	1.695	827	1.755	222	180
2001	4.762	1.707	828	1.820	224	183
2002	4.781	1.703	837	1.826	228	187
2003	4.763	1.685	1.091	1.465	333	189
2004	4.885	1.720	1.198	1.445	313	209
2005	4.871	1.713	1.183	1.451	313	210
2006	4.895	1.720	1.197	1.452	315	211
2007	4.893	1.723	1.188	1.458	312	213
2008	4.917	1.718	1.184	1.486	312	217
2009	4.787	1.667	1.154	1.458	301	206
2010	4.714	1.627	1.147	1.453	290	197
2011	4.641	1.606	1.126	1.429	286	193

Units: Thousands of full work employees.
Source: National Institute of Statistics. Own calculation.

Table A.4 – Overnight stays at national and regional levels

Years	Portugal	North	Center	Lisbon	Alentejo	Algarve
1980	20.966					
1981	21.072					
1982	22.043					
1983	21.787					
1984	21.899					
1985	23.436					
1986	24.137					
1987	24.584	3.249	2.649	7.771	925	9.990
1988	25.572	3.256	2.636	8.214	1.004	10.462
1989	26.615	3.379	3.196	8.238	1.252	10.550
1990	27.735	3.514	3.317	8.454	1.231	11.218
1991	30.268	3.669	3.394	8.547	1.384	13.275
1992	28.369	3.242	3.328	8.033	660	13.106
1993	27.604	3.064	3.417	7.537	1.122	12.465
1994	29.547	3.307	3.364	7.959	1.232	13.686
1995	30.906	3.431	3.543	7.986	1.224	14.722
1996	30.794	3.858	3.334	7.831	1.276	14.494
1997	31.675	3.425	3.809	7.736	1.815	14.890
1998	34.680	3.911	3.563	9.551	1.951	15.703
1999	34.830	4.026	3.707	8.597	1.812	16.689
2000	35.177	4.176	3.838	9.133	1.485	16.544
2001	33.874	3.937	3.634	8.910	1.636	15.759
2002	34.293	4.375	3.687	8.897	1.738	15.597
2003	33.911	4.212	4.760	7.278	1.839	15.822
2004	33.387	4.199	5.065	7.879	1.905	14.340
2005	35.292	4.490	5.281	8.080	1.877	15.564
2006	37.436	4.876	5.594	9.097	1.883	15.986
2007	39.512	5.162	5.848	9.941	2.066	16.495
2008	38.639	5.034	5.828	9.747	2.002	16.028
2009	36.661	5.041	5.615	9.229	2.087	14.690
2010	37.829	5.160	5.767	9.969	2.083	14.850
2011	39.230	5.292	5.694	10.479	2.100	15.664

Units: Thousands of overnight stays of national and foreign tourists in hotels, apartment hotels, tourist apartments, tourist villages, motels, bed & breakfasts, inns, guesthouses and camping parks.
Source: National Institute of Statistics. Own calculation.

APPENDICES

Appendix 1 – Impulse-response functions

Figure 1 - Accumulated impulse–response functions
with respect to a shock to tourism in Portugal

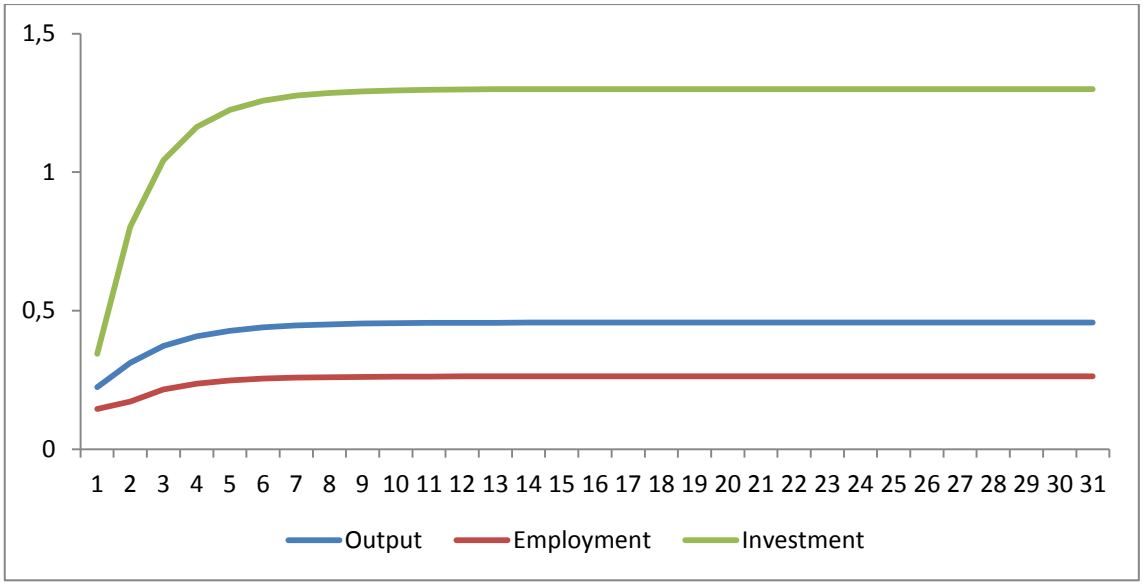
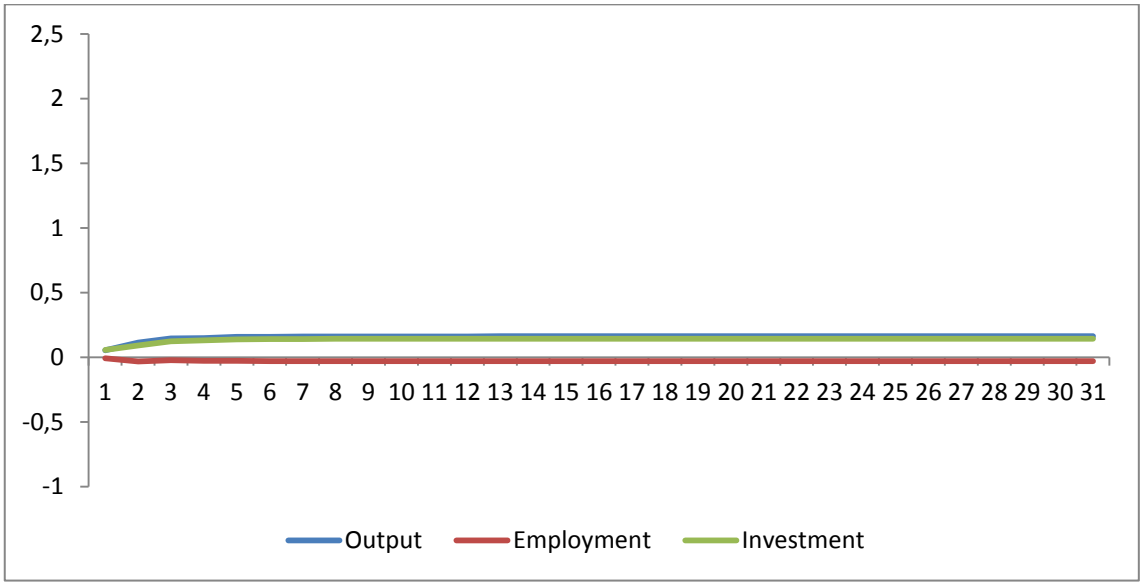


Figure 2 - Accumulated impulse–response functions with respect to a shock to tourism in the North

Panel A - Accumulated impulse–response functions
with respect to a shock to tourism in the region



Panel B - Accumulated impulse–response functions
with respect to a shock to tourism in other regions

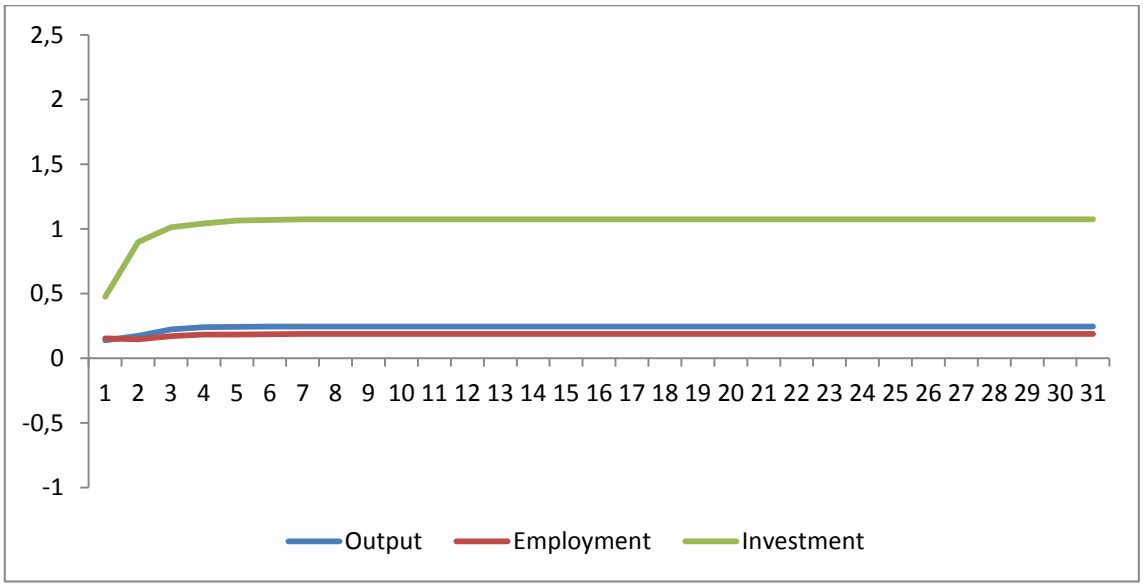
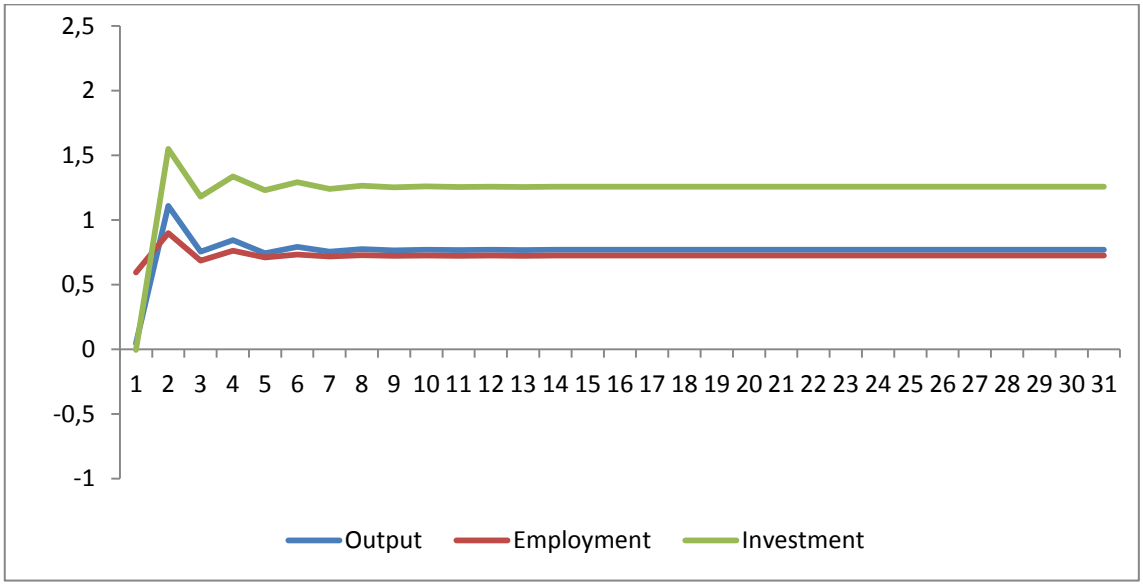


Figure 3 - Accumulated impulse–response functions with respect to a shock to tourism in the Center

Panel A - Accumulated impulse–response functions
with respect to a shock to tourism in the region



Panel B - Accumulated impulse–response functions
with respect to a shock to tourism in other regions

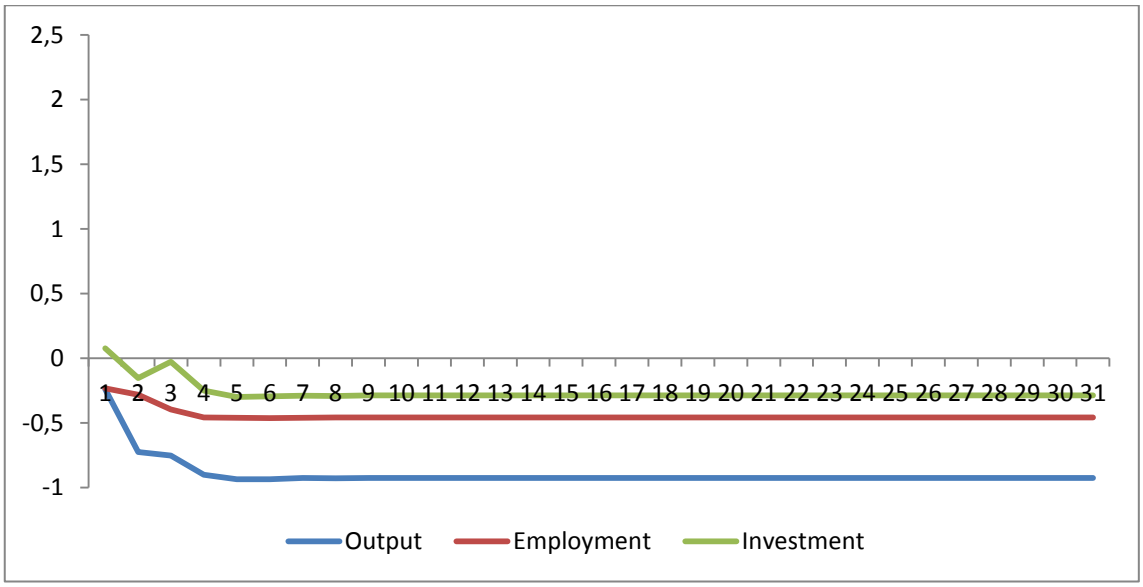
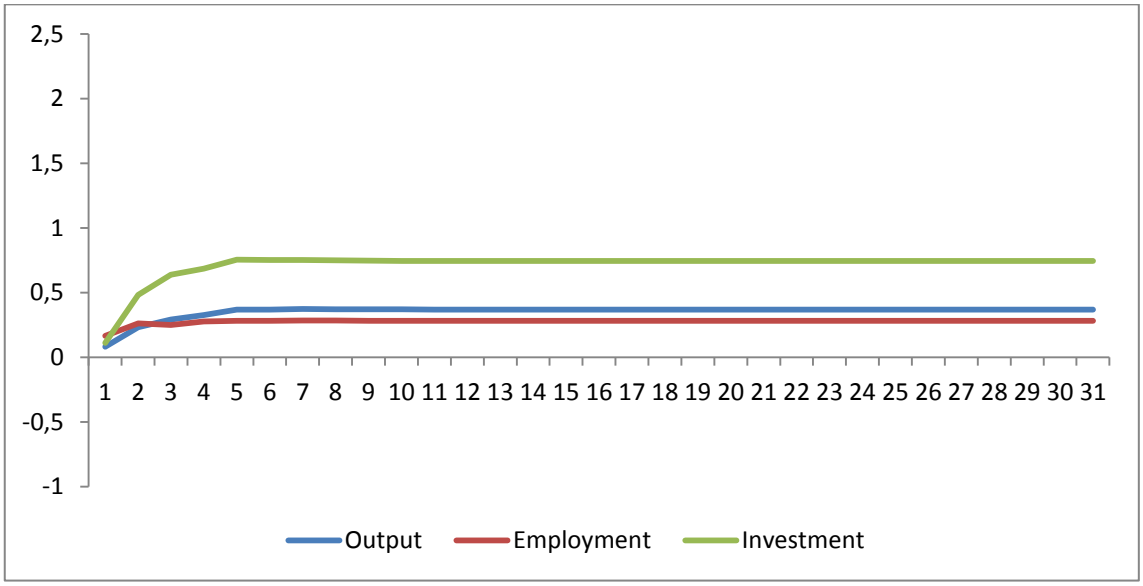


Figure 4 - Accumulated impulse–response functions with respect to a shock to tourism in Lisbon

Panel A - Accumulated impulse–response functions
with respect to a shock to tourism in the region



Panel B - Accumulated impulse–response functions
with respect to a shock to tourism in other regions

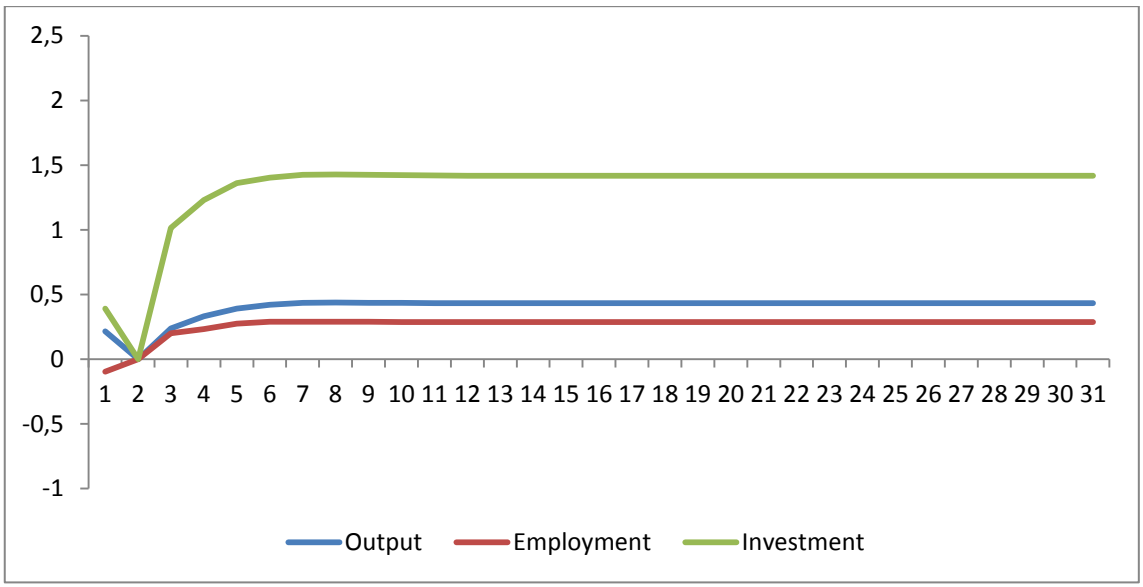
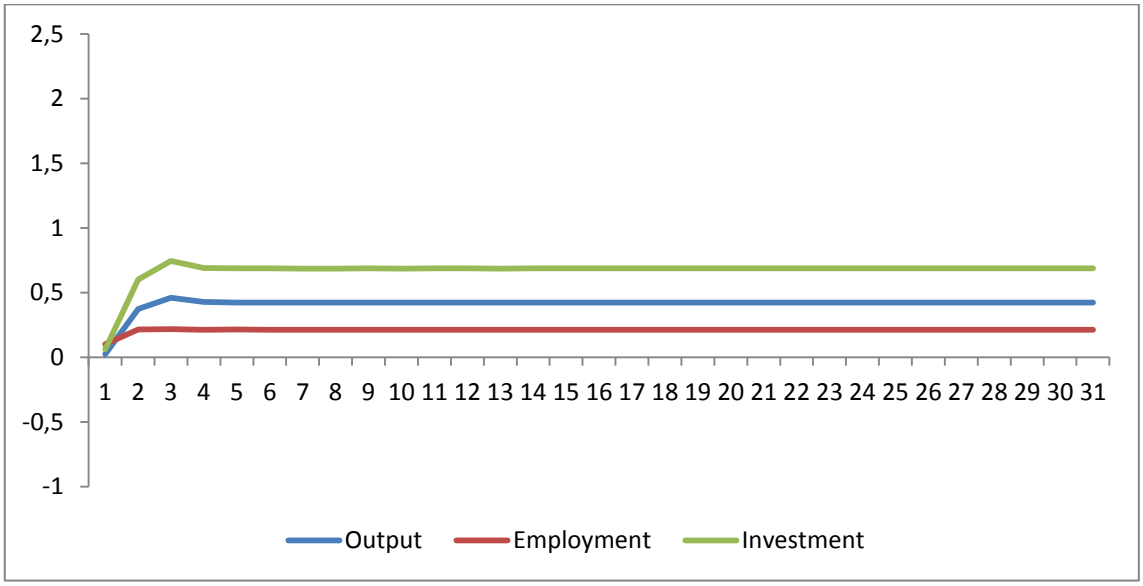


Figure 5 - Accumulated impulse–response functions with respect to a shock to tourism in the Alentejo

Panel A - Accumulated impulse–response functions
with respect to a shock to tourism in the region



Panel B - Accumulated impulse–response functions
with respect to a shock to tourism in other regions

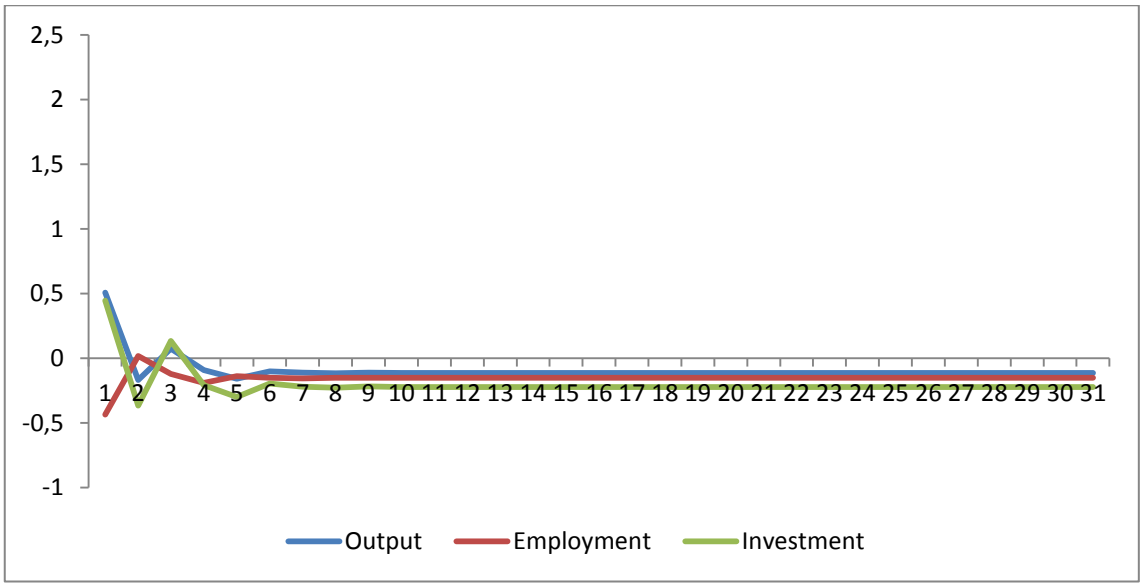
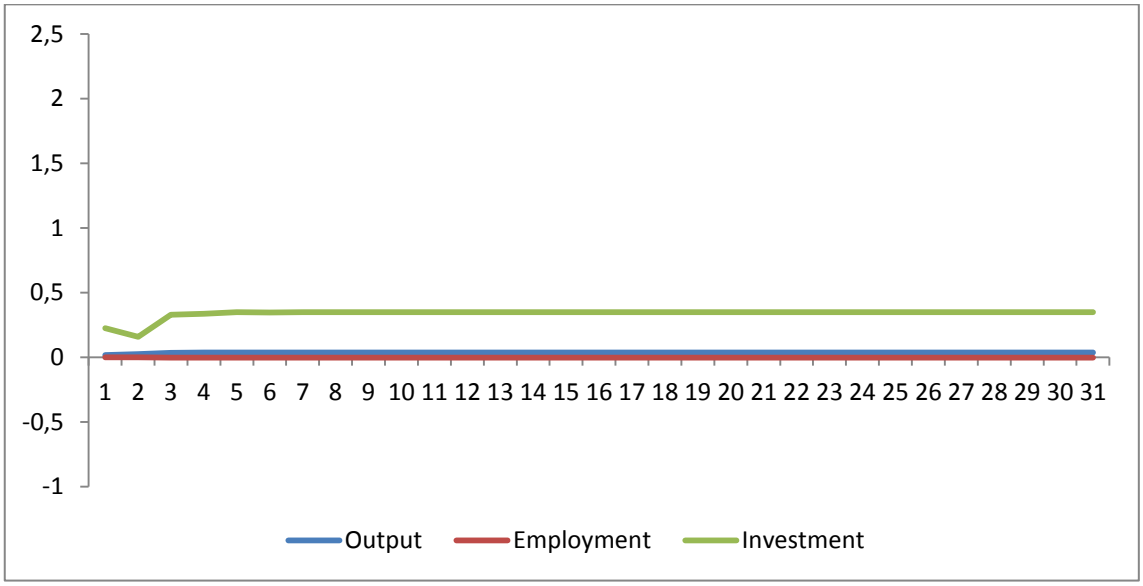


Figure 6 - Accumulated impulse–response functions with respect to a shock to tourism in the Algarve

Panel A - Accumulated impulse–response functions with respect to a shock to tourism in the region



Panel B - Accumulated impulse–response functions with respect to a shock to tourism in other regions