



Cruises tourism in Lisbon: the impact on the Portuguese economy

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Abstract

This paper aims to demonstrate the broad impact of demand for goods and services on the Portuguese economy, made by cruise tourists who stop over in the Port of Lisbon.

The paper applies the input-output matrix methodology in order to measure both direct and indirect effects on the Portuguese economy.

Based on the most updated data available (2016), it is shown that direct demand exerted by cruise tourists in Lisbon, in the total amount of EUR 17,799,011, limited to certain activity sectors, spreads across all sectors of the national economy, by inducing to a dynamic in total national production, reaching EUR 29,329,662 (which can be quantified for each of the 62 activity sectors considered in the input-output matrix).

Keywords: Cruise tourism; Lisbon tourism; Cross-sectorial economic impacts; Input-output matrix.

1. Introduction

Cruise tourism in the city of Lisbon, capital of Portugal, has experienced a significant increase in the last decade: the number of cruise passengers stopping over in the Port of Lisbon increased from 270,893, in 2006, to 522,501, in 2016 – registering an increase of 93% – while the number of cruise ships increased in the same period from 274 to 336, – corresponding to an increase of 23% – according to data published in Porto de Lisboa (2006, 2016), contributing, not only to Port of Lisbon's economic activity, but also to the overall economy of the city and the country.

Some studies have been conducted on the economic effects of cruise tourism in Lisbon, based on surveys made to cruise tourists – as it can be seen in the Observatório do Turismo de Lisboa (2016) (i.e., Lisbon Tourism Observatory, 2016) – but all of them only focussed on the direct effects of that tourism on the economy, not considering the

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indirect effects, which include the entire upstream productive chain of services provided to cruise tourists, obviously producing a much more comprehensive and important impact on the Portuguese economy.

This paper quantifies all these direct and indirect effects of cruise tourism in the city of Lisbon on the Portuguese economy, in the year 2016, using the well-known input-output methodology, based on a matrix of technical coefficients of the Portuguese economy, with a breakdown in 62 activity sectors (according to the Portugal's National Statistical Institute (INE)).

The main results, with data from 2016, show that the impacts of cruise tourism go far beyond the direct demand exerted by cruise tourists, spreading across the country's economy.

This paper is organised as follows: after this introduction, the contextual settings are presented in section 2, followed by the literature survey (section 3). In section 4, it is presented the methodology, including the research hypotheses. The data and results are then presented in section 5, followed by the 6th and last section, dedicated to the conclusions and some discussion about the subject.

2. Contextual setting

The economic recovery of Portugal after the financial intervention of the Troika, made up of the International Monetary Fund, the European Central Bank and the European Commission, was boosted by the strong consolidated growth of the tourism sector in the last few years (according to data from the State Tourism Office of Portugal, the increase in tourism revenues in 2016 was 10.7%, and already was 9.3% in 2015, which places tourism at around half of the Portuguese exports of services), as a result of the dynamics of the sector and the insecurity derived from Islamic fundamentalism in other European countries, and the "Arab springs", meanwhile occurred in North Africa, both destinations of great tourist demand.

Portugal remained apart from these occurrences, being a very safe country (in the Global Peace Index, prepared by the Institute of Economy and Peace, Portugal occupies, in 2017, the honourable third place of the safest countries, among 162 countries), with a pleasant climate, good beaches, a very rich and ancient heritage, a diverse landscape and an increasingly recognized worldwide gastronomy. In this context of tourism growth, cruise tourism in the city of Lisbon has been gaining more and more interest, with an average annual growth of 2.6% in terms of passengers in the last six years, and 1.8%, in terms of number of vessels, as shown in Table 1 below:

Table 1: Maritime navigation - movement of passengers and ships in the port of Lisbon

<i>Nr. of passengers</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>	<i>2016</i>
Boarded	26.248	25.273	23.424	24.652	21.315	20.792	24.111
Landed	26.365	24.091	20.582	26.790	20.121	21.744	23.525
In Transit	395.884	453.280	478.598	507.992	459.997	469.592	474.865
Total	448.497	502.644	522.604	559.434	501.433	512.128	522.501
<i>Nr. of Ships*</i>	302	332	321	364	364	320	336

Source: Porto de Lisboa (2011, 2012, 2013, 2014, 2015, 2016).

* It includes, nonetheless, some non-cruise passenger ships.

Thus, it is in this context of cruise tourism growth in Lisbon that, as previously mentioned, this paper intends to identify, for the year 2016 (latest available data), the direct and indirect impacts of this tourism, on the Portuguese economy, that is, to determine the extent to which the demand by cruise tourists has boosted the production of the national economy.

3. Literature survey

The impact of cruise tourism has been addressed by several researchers in its different aspects (economic, social, cultural and environmental) in the last three decades, as briefly outlined below.

Mescon and Vozikis (1985) measured the economic impact that cruise industry tourism has at the port of Miami, using a regional input-output model, with data from 1982.

West (1993) estimated the economic significance of tourism activity in the Queensland (Australia) economy in an integrated modelling framework, which combines the social accounting (cross-sectorial) matrix with econometric (time-series) relationships.

Dwyer and Forsyth (1996) developed a framework, which provides some estimates of the economic impact of cruise tourism in Australia, differentiating the typology of cruises, and dividing the passenger and operator purchases. In another paper, the same authors (Dwyer and Forsyth, 1998), developed a general equilibrium model for assessing the economic impacts of cruise tourism for a nation and its sub regions.

Hall (2001) provided a review of some of the coastal and maritime tourism literature.

Chase and Alon (2002) developed a Keynesian multiplier model, with an econometric estimation of their equations, to evaluate the impact of cruise tourism on a destination, applying this model to Barbados economy.

Mason (2003) analysed the various impacts of tourism, reserving the chapter 4 of his book to the economic impacts.

Gibson and Bentley (2007) tried to capture the main social and economic impacts of cruise tourism at the main port of the South West of England through a survey of the local population.

Brida and Zapata (2010a) described the evolution of cruise tourism and its impacts in the Caribbean region, curiously concluding that there is no certainty about the sustainability of this type of tourism, nor a serious evaluation of all. In the same year, in another study, these authors (Brida and Zapata, 2010b), based on tourism surveys, compared the average expenditure of cruise passengers with that of land tourists who visit Costa Rica, and concluded that cruise passengers spend less time and money than land tourists.

On tourism flows and their sensitivity to prices, Di Giacinto and Migliardi (2013) estimated cointegrated vector autoregressive models to quantify the impact of the expansion of low cost carriers on foreign tourism trends in Italy.

Given the growing interest of cruise tourists in Asia, Chen (2016) applied the Fuzzy Delphi and Fuzzy IPA methods to try to explore how Taiwan could build a niche in Asia's cruise tourism, and thereby increasing its future economic impacts.

Somewhat following these studies, this work intends to be a first approach in the measurement of direct and indirect impacts on the Portuguese cruise tourism economy in the Port of Lisbon, using the input-output methodology, and based on data collected in a survey of cruise tourists, both methodologies frequently used in the literature.

4. Methodology

The demand that cruise tourists make has an impact that extends across the economy. In fact, we can identify:

1. The direct effects of the demand for goods and services by cruise tourists in the country, in the production of the set of activities requested by them (food, cultural and recreational visits, trips, souvenirs and other purchases).
2. The indirect effects of the demand for goods and services by cruise tourists in the country, considering not only the inputs provided by several companies ("second level" companies) to the activities directly requested by cruise tourists, but also the inputs that these second level companies have to acquire to make their production feasible, and so on, in a chain of impacts that can be extended by several levels.

In order to measure the generality of the aforementioned impacts and in particular the chain of effects that, from the final demand for a given sector or set of sectors, extends across the economy, the most consensual method among economists is that which uses the input-output matrix. It is a matrix of inter-sectoral relations, that is, of purchases and sales amongst the various sectors of the economy, which, after being properly worked out, allows the impacts referred to in the above paragraphs 1. and 2.

In an economy with n sectors of activity, the input-output matrix is represented as:

$$IO = \begin{bmatrix} X_{11} & X_{12} & \dots & X_{1n} \\ X_{21} & X_{22} & \dots & X_{2n} \\ \dots & \dots & \dots & \dots \\ X_{n1} & X_{n2} & \dots & X_{nn} \end{bmatrix},$$

where, X_{ij} , $i, j = 1, 2, \dots, n$, is the production (output) of the activity sector i used as input in the activity sector j .

From this input-output matrix, we construct the matrix of the technical coefficients:

$$A = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix},$$

where, $a_{ij} = \frac{X_{ij}}{X_j}$, $i, j = 1, 2, \dots, n$, being X_j the total production (output) of the activity sector j , with $j = 1, 2, \dots, n$. Thus, the technical coefficient a_{ij} gives us, for each production unit of the activity sector j , how much this activity sector acquires, as input, to the activity sector i .

It should be noted that:

$$a_{ij} = \frac{X_{ij}}{X_j} \Leftrightarrow X_{ij} = a_{ij} X_j \Leftrightarrow \sum_{j=1}^n X_{ij} = \sum_{j=1}^n a_{ij} X_j, \quad i = 1, 2, \dots, n,$$

giving us the last expression the production of the activity sector i , $i = 1, 2, \dots, n$, which was intended to be used as input (intermediate consumption) in all activity sectors.

Lastly, the final demand vector is defined as:

$$Y = \begin{bmatrix} Y_1 \\ Y_2 \\ \dots \\ Y_n \end{bmatrix},$$

where Y_i is the final demand directed to the activity sector i , $i = 1, 2, \dots, n$.

Then, for the activity sector i , $i = 1, 2, \dots, n$, its total production, X_i , is intended to satisfy both the intermediate consumption of all activity sectors, $\sum_{j=1}^n a_{ij} X_j$, and the final demand directly addressed to it, Y_i , that is:

$$X_i = \sum_{j=1}^n a_{ij} X_j + Y_i, \quad i = 1, 2, \dots, n.$$

The above expression can be written in matrix terms as:

$$X = AX + Y,$$

where, $X = \begin{bmatrix} X_1 \\ X_2 \\ \dots \\ X_n \end{bmatrix}$ is the vector of the total productions of each activity sector.

This matrix equation can be solved in order to X :

$$X = AX + Y \Leftrightarrow X - AX = Y \Leftrightarrow (I - A)X = Y \Leftrightarrow X = (I - A)^{-1}Y, \quad (1)$$

where $(I - A)^{-1}$ is the well-known inverse matrix of Leontief and $I = \begin{bmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & 1 \end{bmatrix}$

the identity matrix of order n .

It should be noted that expression (1) allows the total output of each activity sector, X , as a function of the final demand, Y , since the inverse matrix of Leontief is an array of parameters of the economic system. Thus, knowing the final demand directed to a given activity sector, we will know the direct and indirect production that this final demand will induce in all activity sectors, which allows us to obtain the above mentioned impacts in 1. and 2.

The input-output matrix is also associated with gross value added (*GVA*) coefficients, which allows to obtain the *GVA* of each activity sector, from its total production. Defining GVA_i as the *GVA* of the activity sector i , $i = 1, 2, \dots, n$, we have the following coefficient of *GVA* for the activity sector i :

$$gva_i = \frac{GVA_i}{X_i}, \quad i = 1, 2, \dots, n,$$

which gives the *GVA* of the activity sector i resulting from the production of an output unit in the activity sector i . Solving equality in order to GVA_i , comes as:

$$gva_i = \frac{GVA_i}{X_i} \Leftrightarrow GVA_i = gva_i X_i, \quad i = 1, 2, \dots, n.$$

The above expression can be written in matrix terms as:

$$GVA = \hat{gva} X, \quad (2)$$

where, $GVA = \begin{bmatrix} GVA_1 \\ GVA_2 \\ \dots \\ GVA_n \end{bmatrix}$ is the vector with the *GVA* of each activity sector and

$$\hat{gva} = \begin{bmatrix} gva_1 & 0 & \dots & 0 \\ 0 & gva_2 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & gva_n \end{bmatrix}$$
 a diagonal matrix with the *GVA* coefficients of each

activity sector.

It should be noted that expression (2) allows to obtain the *GVA* of each activity sector, as a function of only the total production of each activity sector, *X*, since the diagonal matrix with the coefficients of $\hat{GVA, gva}$, is a matrix of parameters of the economic system. Thus, knowing the total production of a given activity sector, we will know the *GVA* that this production will induce in this activity sector.

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Therefore, with (1) and (2), the direct and indirect impacts of a given final demand on all sectors of the economy can be obtained under the assumption that the structure of the economy in matrix *A* remains stable and valid for a certain period of time.

5. Data and results

In this study, the matrix *A* of technical coefficients constructed for the Portuguese economy, by the Department of Foresight and Planning and International Relations (DPPRI, in Portuguese) of the Environment, Spatial Planning and Regional Development Ministry, was used, with data referring to the year 2008, with a breakdown of 62 activity sectors. The construction of a technical coefficients matrix involves particular care and, although there exist post-2008 input-output matrices, that of 2008 already has evidence in terms of its consistency and has been used in many different studies on the Portuguese economy. On the other hand, the construction methodology of intermediate consumption matrices underwent some changes when they were no longer built by DPPRI and passed to the sphere of the Portuguese National Institute of Statistics. Moreover, because of its nature of reflecting the structure of intersectoral relations, it is accepted that this same structure should only have marginal changes over a significant number of years. For all these reasons, the matrix of technical coefficients for 2008 remains a valid, stable and well representative matrix of the real structure of the intersectoral relations of the Portuguese economy for the whole period under analysis.

It should be noted, however, that only the technical coefficients, i.e., the "structure remaining", refer to the year 2008. All figures presented for production, *GVA* and final demand, are values referring to the year 2016.

As regards the data on the final demand of cruise tourists, the "Passenger Survey of Cruise" stopping over in the Port of Lisbon was used, as repeatedly mentioned before, carried out by the Lisbon Tourism Observatory in 2016 (Observatório do Turismo de Lisboa (2016)). In this survey, a 998 passengers sample from 52 cruise ships was surveyed, which allowed us to obtain the following pattern of expenditures:

Table 2: Demand by the cruise tourists of the Port of Lisbon in 2016 - data of the survey

<i>Expenditure typology (demand)</i>	<i>Input output matrix sector</i>	<i>% of tourists reporting that they incurred this expense</i>	<i>Average expenditure per tourist (in euros)</i>
Visit monuments and/or attractions	90-92	13.0	9.33
Shopping	47	43.9	34.24
Feeding	55-56	45.8	23.48
City trips	49	41.0	12.65
Tour bought locally	79	2.6	24.90
Accommodation	55-56	1.4	93.04
Others	79	0.0	-

Source: Observatório do Turismo de Lisboa (2016).

Applying the percentages of the third column of Table 2 to the 522,501 cruise tourists who passed by the Port of Lisbon in 2016 (see Table 1), we obtain the number of tourists that make each type of expense. Then, having used the average expenditure per tourist in the fourth column of Table 2, we know the total expenditure of cruise tourists for each expenditure type considered. The values thus obtained are shown in Table 3 below:

Table 3: Demand by the total cruise tourists of the Port of Lisbon, in 2016

<i>Expenditure typology (demand)</i>	<i>Input output matrix sector</i>	<i>% of tourists reporting that they incurred this expense</i>	<i>Total expenditure (in euros)</i>
Visit monuments and/or attractions	90-92	67,925	633,740.25
Shopping	47	229,378	7,853,902.72
Feeding	55-56	239,305	5,618,881.40
City trips	49	214,225	2,709,946.25
Tour bought locally	79	13,585	338,266.50
Accommodation	55-56	7,315	680,587.60
Others	79	0	0.00

Source: Own construction, based on data from Porto de Lisboa (2016) and Observatório do Turismo de Lisboa (2016).

By introducing the final demand values of the cruise tourists referred to in the fourth column of Table 3 in their respective sectors of Y vector of the final demand, we can obtain from (1), the sectoral production vector X. Then Applying (2) we obtain the GVA vector for each of the 62 activity sectors of the Portuguese economy, considered IO matrix:

Table 4: Economic impacts in the portuguese economy, in 2016.
Made by cruise tourists who stopped over in the Port of Lisbon.

Nr.	Activity Sectors Name	Variation in the final demand induced by cruise tourists (euros)	Direct and indirect impacts in different activity sectors	
			Production (euros)	GVA (euros)
01	Products of agriculture, animal husbandry, hunting and related services	0	325500	113749
02	Products of forestry, logging and related services	0	7526	5262
03	Fishery and aquaculture products and related services	0	38234	24974
05_09	Ceres and other products of the extractive industries	0	16419	6949
10_12	Food, beverages and tobacco industry	0	1051769	223701
13_15	Textile, clothing and leather products	0	29493	9948
16	Wood and articles of cork, except furniture, and articles of straw and plaiting materials	0	59425	13628
17	Paper and cardboard and articles	0	44660	11479
18	Printing and engraving services	0	74022	74999
19	Coke, refined petroleum products and egg concentrates of fuels	0	656771	35521
20	Chemicals and synthetic or artificial fibers	0	34651	11770
21	Pharmaceuticals - basic and auxiliary products	0	1766	728
22	Rubber and plastic products	0	34231	17940
23	Other non-metallic mineral products	0	95629	31956
24	Base metals	0	18931	2904
25	Processed metal products, except machinery and equipment	0	33514	45623
26	Computer, electronic and optical products	0	9300	2455
27	Electrical equipment	0	25476	5979
28	Machinery and equipment, n.e.	0	3198	1022
29	Motor vehicles, trailers and semi trailers	0	6990	1096
30	Other transport equipment	0	3426	1'90
31_32	Furniture and other products of the manufacturing industry	0	34394	12233
33	Repair and installation services of machinery and equipment	0	63854	63746
35	Electricity, gas, steam, hot and cold water and cold air	0	1052370	20'650
36	Water collection, treatment and distributor	0	48926	23189
37_39	Sewage, waste management and decontamination services	0	27324	10270
41_43	Buildings and construction works	0	651909	210737
45	Wholesale and retail sales and repair services of motor vehicles and motorcycles	0	81613	79200
46	Wholesale trade, except of motor vehicles and motorcycles	0	869242	420805
47	Retail sale except of motor vehicles and motorcycles	7853903	8140322	5159031
49	Pipeline transport services	2673633	3167197	1247871
50	Water transport services	0	4580	1'25
51	Air transport services	0	46352	8883
52	Storage and auxiliary transport services	0	214858	118742
53	Postal and courier services	0	70520	39369
55_56	Accommodation and catering services (restaurants and similar)	6299469	6393679	3376628
58	Editing services	0	55233	20021
59_60	Audiovisual and broadcasting activities	0	90884	28461
61	Telecommunication services	0	295519	135704
62_63	Computer consulting and programming and related services; and information services	0	729062	63554
64	Financial services, except insurance and pension funds	0	596754	389562
65	Insurance, reinsurance and pension funding services, except compulsory social security services	0	53343	34560
66	Services auxiliary to financial and insurance services	0	25446	15466
68	Real estate services	0	397472	322435
69_70	Legal and accounting services; social services; consulting and management services	0	569417	334761
71	Architectural and engineering services; technical testing and analysis services	0	251569	120232
72	Scientific research and development services	0	42023	29329
73	Advertising and market research services	0	604371	197687
74_75	Other consulting, scientific, technical and similar services; veterinary services	0	49266	23969
77	Rental services	0	284412	170153
78	Employment services	0	31841	13589
79	Travel agency, tour operator and other reservation and related services	336267	374813	114329
80_82	Other administrative and support services	0	737341	395101
84	Public administration, defense and compulsory social security services	0	4188	3023
85	Education services	0	21328	18263
86	Human health services	0	46336	26145
87_88	Social action services	0	8	4
90_92	Creative, artistic and performing services; libraries, archives and other cultural services; lotteries and gambling	633740	653061	310303
93	Sports, entertainment and recreation services	0	27065	11202
94	Services provided by associative organizations	0	25087	9406
95	Repair services of computers and personal and household goods	0	56534	30671
96	Other personal services	0	10771	5894
	Total	17799011	29329662	14436423

Source: Own construction, based on (1), (2) and data from Porto de Lisboa (2016) and Observatório do Turismo de Lisboa (2016).

As it can be seen, the direct demand of cruise tourists in 2016 was addressed to 6 of the 62 activity sectors considered in the input-output matrix for the Portuguese economy, reaching a total value of EUR 17,799,011. However, this direct demand has extended its effects to all activity sectors of the national economy, through the inter-sectoral relationships that are established in the Portuguese economy. Considering the totality of the direct and indirect effects, the tourists of cruises who stop over in Lisbon contribute to a production in all sectors of the national economy in the amount of EUR 29,329,662 and for a total *GVA* of EUR 14,436,423, which shows well that the impact of cruise tourism goes far beyond the ultimate demand of tourists, spreading across the economy.

6. Conclusions and final considerations

With this study we could confirm that, although the direct effects of cruise tourism in the Port of Lisbon on the Portuguese economy are truly significant and important for the city of Lisbon and for the country, they nevertheless result in a reductive analysis of the impact generated in the national economy, being essential the determination of indirect effects.

With data from 2016, it was possible to conclude that the demand of cruise tourists in the city of Lisbon had a direct impact on the economy, targeting 6 activity sectors and generating a total production in the amount of EUR 17,799.01.

Nevertheless, the total amount of the national production, induced by the direct demand in question, had an effect on all 62 sectors of the national economy, resulting in a much larger value of the total production, reaching a total of EUR 29,329,662 and a total *GVA* of EUR 14,436,423, showing well the indirect multiplier effect generated, which should not be forgotten in studies of this nature.

These values justify the authorities' commitment of the municipality of Lisbon and the Administration of the Port of Lisbon, by energizing and promoting cruise tourism. They also justify the support and incentives granted by the central government, as the effects extend - as it has been confirmed - to the entire economy of the country.

Future research on the impact of cruise tourism on the Portuguese economy should also include the effects on the port activity itself, which was not taken into account in the present study, since only the impacts of tourists' demand were analysed, not including the demand for port activities by the companies that promote the cruises.

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