Modelling and **Forecasting Tourism Demand** in Portugal: Past, Present and Future

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Abstract | A literature survey shows that considerable attention has been given to tourism demand forecasting. However, in Portugal only the *Direcção Geral do Turismo* (General Tourism Board), *Investimentos, Comércio e Turismo de Portugal* (Investments, Commerce and Tourism for Portugal), and academic researchers have carried out some work on tourism demand modelling and forecasting. Research on recent developments and methodologies for modelling and forecasting tourism in Portugal is still quite limited. Hence, the main purpose of this paper is to survey the empirical research available to date for Portugal and provide suggestions for future studies.

Keywords | Modelling, Forecasting, Tourism Demand, Portugal.

Resumo | Uma revisão de literatura mostra que a previsão da procura turística tem merecido uma atenção considerável. Contudo, em Portugal apenas a DGT (Direcção Geral do Turismo), o ICEP (Investimentos, Comércio e Turismo de Portugal), e investigadores académicos têm desenvolvido algum trabalho na modelização e previsão da procura turística. A investigação em desenvolvimentos recentes e metodologias para modelar e prever o turismo em Portugal continua a ser limitada. Por isso, o principal objectivo deste artigo é rever a investigação empírica disponível para Portugal, assim como sugerir alguns estudos futuros.

Palavras-chave | Modelização, Previsão, Procura Turística, Portugal.

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1. Introduction

Although tourism is not a recent phenomenon, it was only in the 20th century that this industry was recognised as an important economic activity of worldwide level that directly and indirectly affects the greater part of society.

In terms of its evolutionary course, in 1950 the number of international tourist arrivals was at 25 million, while in 2004 this figure grew to 762.5 million according to the World Tourism Organisation (2005). Only in 1982, 2001 and 2003 were breaks in the series verified as a result of economic restrictions of Eastern and Central Europe, Poland's political and economic climate, and the 9/11 attacks in New York. The decrease observed in 2003 was due essentially to three factors: the Iraq war in March 2003, the SARS (Severe Acute Respiratory Syndrome) virus outbreak (also known as atypical pneumonia) and the postponement of the world economic recovery.

According to the World Tourism Organisation (WTO), the number of international tourist arrivals will reach 1.6 thousand million in 2020, 2.5 times the volume registered in the late 90s. The same source predicts that the number of international tourist arrivals to Europe will reach 717 million in 2020, representing an average annual growth of 3,1%, a figure slightly lower than that of world growth. Based on these indications, Europe will lose absolute majority in terms of international tourist arrivals (the share will be about 45%)[1]. The WTO believes that Portugal will reach 18.3 million inbound tourists in 2020; see Silva (2003). Given the importance of tourism as one of the main economic industries, it is of great interest to analyse what has already been done and what can be done in terms of modelling and forecasting tourism demand.

This topic has deserved significant worldwide attention at international level. Few studies are, however, available on tourism in Portugal. Although over the last few years studies have turned to tourism demand, there is a need for further research and application of recent developments and methodologies for modelling and forecasting. The main purpose of this paper is to review empirical research on tourism demand modelling and forecasting for Portugal and present some insight as to important directions needed for future research.

2. Brief characterisation of Portuguese tourism

Over the last century Portuguese tourism experienced significant changes. Despite the first official tourism organisation being founded in 1911 at the time referred to as the *Repartição do Turismo* or Tourism Department and part of the Ministry of Development *(Ministério do Fomento)*, it was only in the 60s that signs of tourism development became apparent.

In fact, this past decade witnessed a surge in the building of infrastructures such as hotels and transportation facilities. These developments occurred mostly in Lisbon leaving Madeira and Algarve relying on natural factors such as "sun and sea". The discrepancy of investments will have negative implications in the future tourism demand. Salazar in 1965 showed some concern with the Algarve in terms of overdevelopment of accommodation establishments and the destruction of land due to tourism, "I fear that we are destroying Algarve with the hurry of endowing it of a number of rooms, considered necessary to the development of tourism. But tourism will pass and the Algarve will stay. And if we deform it because of tourism, we will never again recompose it" (Vieira, 1997: 34).

The 60s and 70s were marked by a strong growth of the industry and although the April Revolution had a negative impact, the situation stabilised by the beginning of the 80s.

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[1] In 2004, the figure was 54%.

Several authors agree that the 80s registered a high growth in the industry; see among others Cunha (1997), DGT (1994), Eusébio (1998), Eusébio *et al.* (2001), and Norberto (1995). Entry of foreign visitors into Portugal increased by 162% when compared to 1980 and 1990. However, between the end of the 80s until the first half of the 90s, Portugal moved from "moderate" growth to "weak" growth (Eusébio, 1998). Cunha (1997: 101-102) reinforced this view stating that,

> "... the evolution of Portuguese tourism between 1990 and 1995 witnessed an exhaustion of developmental initiatives started in the 60s as a result of the overuse of the "sun and sea" slogan. There were clear signs that Portuguese tourism risked entering degeneration if new strategies involving rejuvenation and quality tourism products were not adopted".

In the last decade the number of foreign visitors increased from 18.5 million to 27 million and the number of foreign tourists from 8 million to 11 million. However, the evolution of the revenue generated from tourists visiting Portugal and the amount spent on a daily basis during their stay has not been favourable. Although in nominal terms these two variables registered a growth, in real terms the reverse was observed.

In a recent work developed by DGT (2005), the average growth relative to inbound tourism for Portugal from 1998 to 2003, was only of 0,6%, not far from the growth rate observed between 2002 and 2003, that is, 0,5%.

Reasons for this slow growth include unfavourable economic conditions worldwide, the massification of tourism – particularly in those areas of the country that followed the three Ss model (sun, sea and sand) over the last few decades, seasonality – one of the main features of tourism, Portugal's extreme dependence on a reduced number of markets, and the increase of industry competitiveness of the sector, namely of countries that offer the same conditions as ours may be the reason for these results.

In fact, for some time tourists visiting Portugal originated from Spain, the United Kingdom, Germany, France and The Netherlands in decreasing order, respectively. Although Spain is responsible for almost half of the tourists, this group of countries is responsible for more than 4/5 of the total visitors that enter Portugal. Table 1 shows the number of tourists in Portugal over recent years according to these five countries.

In terms of inbound tourism demand to Portugal, countries such as the USA, Italy, Belgium, among others, are able to diversify in order to reduce tourist dependence from a reduced number of generating countries.

Domestic demand also plays an important role. According to and following Cunha (2003: 35), "in Portugal, the mistake of identifying tourism with the external demand continues to be made; however, domestic demand can justify tourism development in a lot of regions". With Portugal ranking 30th in the world as one of the most expensive tourist destinations, the country runs the risk of becoming an exclusively issuing country with the consequent implication of revenues shifting to other more affordable countries.

As such, it becomes necessary to diversify the tourist products and in specific replacing the three traditional Ss with a new meaning, that is

Table 1 | Number of tourists in Portugal by main origin countries (1998-2003)

Origin country	1998	1999	2000	2001	2002	2003
Germany	988 825	1 010 223	951 887	908 625	851 596	848 339
Spain	5 244 812	5 321 318	5 614 969	5 668 903	5 396 310	5 431 288
U. Kingdom	1 750 044	1 868 057	1 892 080	1 976 870	1 858 177	1 873 999
France	790 431	778 571	842 716	875 855	844 905	843 762
Netherlands	439 972	487 165	499 470	494 603	482 613	479 271

Source: DGT, 2005

"sophistication, specialisation and satisfaction". These refer to sophistication in terms of offer, specialisation of destinations and consumer satisfaction (see Cunha, 2003). For instance, the growth registered over the last few years for "tourism in rural spaces", characterised by the offer of a different typology of lodgings and the inclusion of a greater diversity of tourist activities, is an example of the effort that has been made in this direction.

The significance and importance of modelling and/or forecasting tourism demand in Portugal is, therefore, quite evident. The following section presents an overview of the research developed in Portugal.

3. Modelling and forecasting tourism demand in Portugal: past and present

A survey of the tourism demand forecasting literature allows us to conclude that this issue has deserved considerable attention worldwide. However, at the national level, only the Portuguese tourism organisations, the General Tourism Board (*Direcção Geral do Turismo* or DGT) and Investments, Commerce and Tourism for Portugal (*Investimentos, Comércio e Turismo de Portugal* or ICEP) together with academic researchers have carried out some work on modelling and forecasting tourism demand.

Table 2 | Empirical studies about tourism demand in Portugal

Date	Author	Designation of the study	Models
1991	Silva, J. A.	"O turismo em Portugal – uma análise de integração micro-macroeconómica"	Econometric
1995	Silva, J. A.	"A modelização da procura turística em Portugal – um ensaio econométrico"	Econometric
1996	Raminhos, M.	"Modelização das receitas de turismo em Portugal: cointegração, especificação dinâmica e previsão"	Econometric (cointegration and ECM models)
1996	Carvalho, A.	"Previsão de curto prazo de alguns indicadores da actividade turística em Portugal"	Transfer function
1997	Gonçalves, V. and Águas, P.	"The concept of life cycle: an application to the tourist product"	Univariate models (trend curve analysis)
1997	Macedo, M.	"Indicador avançado da procura turística em Portugal"	Transfer function and Box-Jenkins
1998	Santos, D.	"A previsão da procura turística em Portugal: comparação de diversos métodos de previsão"	Univariate models (Naïve 1; Holt Winters; trend curve analysis; Box-Jenkins); VAR and VAR with ECM and transfer function
1998	Eusébio, C. A.	"O turismo e a política cambial em Portugal – a influência das taxas de câmbio na procura externa de Portugal"	Econometric
1999	Daniel, A.	"Previsão da procura turística em Portugal: cointegração, modelos ECM e modelos univariados"	Econometric (cointegration and ECM models) and univariate models (Naïve 1 and Naïve 2; Brown; TCA)
2000	Fernandes, P. and Cepeda, F.	"Evolução do turismo na região Norte de Portugal: aplicação do ciclo de vida"	Univariate models (Trend Curve Analysis)
2000	Correia, A.	"A procura turística no Algarve"	Translog function
2000	Matos, A.	"A modelização econométrica da procura turística em Portugal"	Multiequational econometric model
2001	Eusébio, C., Castro, E., Costa C.	"A influência do nível de preços na procura turística externa em Portugal"	Econometric
2001	Daniel, A. and Tomé, F.	"A previsão da procura turística – estudo do caso Português"	Univariate models (Naïve 1 and Naïve 2; Brown; MA)
2001	Correia, A.	"Tourism demand in Algarve – a translog approach"	Translog function
2002	Daniel, A. and Ramos, F.	"Modelling inbound international tourism demand to Portugal"	Econometric (cointegration and ECM models)
2003	Silva, J. S.	"A procura turística externa em Portugal – tendências de evolução a médio e a longo prazo"	Macroeconomic projection model
2003	Rodrigues, P. M. M. and Gouveia, P.	"An application of PAR models for tourism forecasting"	Periodic autoregressive models

From Table 2 we observe that the first studies related to Portugal started to appear in the early 90s. To the best of our knowledge, no previous relevant work is available.

These studies essentially analyse tourism demand in Portugal as a whole, with only very few studies on tourism demand in Algarve (one of Portugal's most important tourism areas) and one study on tourism demand on northern Portugal. Most of these look at international tourism demand for Portugal, though some begin to focus on domestic tourism.

The majority of the models developed are causal or univariate time series models. Some of these studies do not, however, do any forecasting since their main purpose is to analyse causal relationships between variables. Within causal forecast methods econometric models are commonly used with recent application methodologies proposed, such as cointegration analysis and/or error correction models (ECM). A further interesting application is the use transfer function models[2].

In terms of qualitative forecast techniques, to the best of our knowledge no application has been extended to tourism demand forecasting for Portugal. Furthermore, seasonality is one important feature of tourism demand series which Rodrigues and Gouveia (2003) have modelled through the use of PAR[3] models. There is, however, still a large analytical gap in this context which needs to be further developed.

In Table 3 some of the causal methods are presented as well as the involved variables.

Most of the methods use the same dependent variable as a measure of tourism demand, as well as the same explanatory variables. We limit our results if the same author uses the same variables in more than one study.

The tourism generating countries considered in nearly all models are Germany, Spain, France, The Netherlands and the United Kingdom, since these five countries continue to be the main sources of foreign tourists that visit Portugal. The concern with domestic tourism demand is practically still nonexistent.

Tourism demand is measured by three variables. The first is the number of tourists (definition of tourist according to ONU). The second variable is the average stay of foreign tourists in all types of lodges. Some studies still use the number of nights spent by foreign tourists in hotels and similar lodging establishments. A third variable used is the revenues generated from tourism.

With regard to explanatory variables we begin with income, that is usually measured by the Gross Domestic Product (a global variable) of the country of origin or the real personal disposable income. Other studies use an indicator of the economic activity of the issuing tourist countries, such as the index of industrial production.

Price variables were considered for two components: the cost of living for tourists in Portugal and the cost of travel to Portugal. In terms of the former and observed in Table 3, this variable is defined as "Destination Cost". With exception of a paper by Correia (2001), where the price variable was measured by the average price per room per night, other studies use the Consumer Price Index (CPI) and exchange rates as the basis for analysis, as indicators of the cost of living in Portugal, though not in an isolated manner. In terms of the cost of travel from the country of origin to the destination, two types of costs were considered: air costs and surface costs. Transportation costs were measured based

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[2] "Transfer function models make a useful combination between causal and non causal methods; based on ARIMA models (Box--Jenkins models), they allow the use of one or more series related to the one which is being forecast, thus allowing the explicit consideration of explanatory variables in the model. Univariate ARIMA models deal with a single time series, forecast on the basis of its own past values (and a white noise); transfer function models extend this analysis to multiple time series, therefore, the forecast of one variable being also affected by past values of the other (explanatory) variables" (Macedo and Santos, 1998:2).

[3] "Periodic autoregressive (PAR) models are a class of models used to model seasonally unadjusted data. These models allow for parameters to change according to the seasons of a year" (Rodrigues and Gouveia, 2003: 3).

Table 3 | Some methods and variables included in the models

Date	Author	Causal method	Data freq.	Dependent variable	Explanatory variables								
					Income	Travel cost	Dest. cost	Substi. Dest.cost	Dummy	Trend	Lagged dep. var.	Other var.	Origin countries
1995	Silva, J. A.	Econometric	A	N. of nights spent in all types of lodgement	X		X	X	X[4]	X	X	Lodgement prices[5]	G,S,F,NL UK,P
1996	Raminhos, M.	Econometric (cointegration and ECM)	Q	Real receipts	X		X	X					G,S,F,NL,UK, USA,I,SW
1996	Carvalho, A.	Transfer function	M	Visits								X[6]	G
1997	Macedo, M.	Transfer function	M	N. of nights spent by foreign tourists in hotels and similar establishments	X		X						G,S,F,NL,UK
1998	Eusébio, C. A.	Econometric	M	Visits; cambial receipts; mean stay of foreign tourists in all types of lodgement			X						G,S,F,NL,UK
1999	Daniel, A.	Econometric (cointegration and ECM)	A	Visits	X	X	X		X[7]				G,S,F,NL,UK
2000	Matos, A.	Econometric (multiequational)	A	Visits	X	X		X		X	X	Departures of tourist origin countries; 8;9	G,S,B,USA,F, NL,I,UK
2001	Correia, A.	Transcendenthal logarithmic function	M	Overnights in hotel and similar establishments by country of residence	X		X	X				Promotion; 10; 11	G,S,NL,P,UK
2005	Kastenholz, E.	Econometric	D	Daily expenditure								12	G,UK,F,NL,S

Legend: A – Anual; Q – Quarterly; M – Monthly; D – Daily; G – Germany; S – Spain; F – France; NL – Netherlands; UK – United Kingdom; P – Portugal; USA – United States of America; I – Italy; SW – Sweden; B – Belgium.

on airfares and surface costs were assessed in two ways. Matos (2000), for example, only considered fuel prices, whereas Daniel (1999) considered three distinct factors to calculate these costs: fuel prices; distances between origin and destination capital cities and mean fuel consumption. Surface costs were then computed as the product of these variables.

In terms of substitution prices, this variable measures the competitiveness of other tourist destinations in relation to Portugal. This competitiveness was measured in several ways. In some studies the relative prices of tourism in Portugal in relation to the price of tourism in other countries that also offer similar tourist services were considered. The variable results from the average partial indexes, with these representing the exchange rates of competitive countries. In other studies the quotient between tourist price index of Portugal and tourist price index of competitors were considered.

Given the particularity of the study by Correia (2001), the mean prices per room, per night of competitive Algarve destinations, as the case of "Costa do Sol" in Spain and the "Portuguese Coast" were also considered.

[4] Political event of 25th April, 1974.

[5] Pondered by exchanges rates.

[6] It was considered only input factors and output factors. The input factors are the number of passengers from Germany (only air flights) and the number of nights spent by german tourists in hospitable establishments.

[7] 1979 oil crisis.

[8] Quotient between tourist price index of origin countries and CPI (Consumer Price Index) of origin countries.

[9] Quotient between tourist price index of origin countries and tourist price index at world level.

[10] Average temperature of the air in Algarve.

[11] Number of days of school vacations (proxy of available time).

[12] Food and lodging; age; information; history and culture; fun; duration of stay.

In what refers to the qualitative effects, only two dummies have been considered in research: one relating to the political event of April 25th, 1974 and another relating to the effects of the 1979 oil crisis.

It is common to include lagged dependent variables in tourism demand models to reflect habit persistence and rigidity of supply. In spite of being considered a few times, the Portuguese empirical research trend variable mainly reflects the growth of tourism verified along the years and that suggests the existence of a positive tendency from the demand side.

As can be observed from Table 2, there are only a few studies that apply time series methods. In some cases the purpose of these studies is only to evaluate the forecast performance and not the elaboration of forecasts. However, in other studies these models are used to generate forecasts; see for instance, Gonçalves and Águas (1997) and Fernandes and Cepeda (2000). The main purpose of their papers is to apply the life cycle methodology to tourism in Algarve and in the North of Portugal. The model consists in identifying the phases of the cycle: exploration, involvement, development, consolidation, stagnation and finally poststagnation. This methodology has been applied to explain the evolution of a tourism destination. But it is not a model for forecasting purposes, since some of the destinations do not experience all the phases.

To analyse the different phases of the life cycle, linear regression, polynomial, exponential and logistic models were applied in both studies. The polynomial model was chosen for showing the best adherence to the data set.

The macroeconomic model referred to in Silva (2003), is a model having been already adopted in the past by DGT and consists in the application of the following numerical relationship:

$$Dk + 1 = Dk (1 + Er . \alpha)(1 + Ep . \delta)$$

where D represents the number of foreign tourists or nights spent in hotels or similar establishments;

α the mean variation of GDP of the main inbound tourist markets (at constant prices); Er the elasticity of the number of international tourists or nights spent in relation to the mean variations of GDP; δ the mean variation of tourist prices for the international demand; and Ep the elasticity of the number of international tourists or nights spent in relation to the mean variation of prices for the international demand.

4. Modelling and forecasting tourism demand in Portugal: future

We mentioned earlier that tourism demand allows us to determine that a large gap exists in literature on recent research and application methodologies, namely in the identification and modelling of the main features of these series: non-stationarity, structural breaks, seasonality, as well as the realisation of diagnostic testing, among others.

From a variety of methodologies that could be applied, we look at the following four different approaches[13]:

– Modelling seasonality through univariate models. A comparison to periodic models;

– Causal models: cointegration and ECM models. The Structural Time Series Models (STSM);

– Autoregressive Distributed Lag Model (ADLM): "General-to-Specific" approach;

– The structural instability of tourism demand: the Time Varying Parameter (TVP) Model.

4.1. Modelling seasonality through univariate models. A comparison of its precision with periodic models

Seasonality is one of the main features of tourism series. Allcock, in Witt and Moutinho (1989: 387) defines seasonality as "the tendency of tourist flows to become concentrated into relatively short periods of the year".

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[13] These methodologies are being developed in a Ph.D. thesis by Ana Daniel (Faculty of Economics, University of Algarve).

Besides seasonality, trend modelling is also important. Trend can be deterministic or stochastic. In the former case modelling can be done by including a *time trend*, otherwise it is necessary to differentiate the series to determine stationarity. Similarly, deterministic seasonality can be modelled by including seasonal *dummies*, while in the presence of stochastic seasonality, stationarity can only be found if the series are seasonally differenced.

The Box-Jenkins methodology (i.e. seasonal ARIMA models) has been widely used in the tourism demand modelling literature. The behaviour of seasonal patterns have been analysed by employing unit root tests; see Hylleberg, Engle, Granger and Yoo (1990), Canova and Hansen (1995), Caner (1998), among others. Kim (1999) concludes that seasonal modelling through ARIMA models when based on these tests, produces better results when the forecast performance of the models is considered.

Harvey's (1989) structural time series methodology is also a commonly used procedure. In this model the stochastic specification of seasonality does not require seasonal differencing. Interest in structural time series models grew when identified that these may outperform other models. This is verified when causal models as well as non causal models are considered, namely, STSM and BSM (Structural Based Model), respectively. Kulendran and Witt (2003: 265) state that,

> "They are of considerable interest because González and Moral (1995) have shown that causal STSM generate relatively accurate tourism forecasts compared to the ECM, and González and Moral (1996) and Turner, Kulendran, and Fernando (1997) have shown that BSM generate considerably more accurate tourism forecasts than the univariate ARIMA model".

The simple procedure consists of decomposing the series into four components: trend, seasonality, cycle and irregular. The periodic modelling comprises a period adjustment of either an AR or ARMA model. This adjustment can be observed in Franses (1992) and Osborn (1990). Such procedure arises from authors such as Osborn (1990), criticising the way in which seasonality is modelled.

4.2. Causal models: cointegration and ECM models. The structural time series models (STSM)

In causal models the forecast of a variable is made by considering the relationship between this variable and a group of other related variables.

The economic interpretation of cointegration can be explained as follows: if two or more nonstationary variables are joined by a linear combination to achieve a long-run equilibrium then despite being nonstationary they evolve quite closely along time and difference between them will be stationary. If a variable contains seasonal unit roots, then any potential cointegration between them will have to occur either at the zero or at the remaining frequencies (see Engle *et al.*, 1993). If two or more variables are cointegrated they can have a short term representation through a mechanism referred to as Error Correction Models (ECM).

The interpretation of these models when applied to tourism demand is evidenced in Song, Witt and Li (2003: 365 and 366),

> "The error correction model in the tourism context is based on the assumption that tourists make rational decisions on the demand for tourism at time t using all the information available (income, price, substitute prices, and so on) in the long run, but make occasional errors in purchasing tourism products in the short run due to information asymmetry. As a result of the decision errors made by tourists the demand for tourism in the short run deviates from its long-run equilibrium path (or steady state)… tourists, as rational agents, learn from their mistakes and remove their decision errors in order to achieve the long-run equilibrium demand. Therefore, the demand for tourism the dynamic process is self-correcting."

In the STSM approach, regression and time series analysis are combined. A STSM is set up based on observed components of trends, seasonals and cycles, all of which have direct interpretations. These components can be allowed to vary with time and explanatory variables are included whenever possible.

4.3. Autoregressive distributed lag model (ADLM): the "general-to-specific" approach

Until the 90s, most tourism demand forecasting studies were based on the conventional specific--to-general approach (Witt and Witt, 1995). One of the main criticisms to this approach is the fact that different researchers may obtain different model specifications based on the same data set (Hendry, 1995). This led to the development of the general--to-specific methodology at the beginning of the 90s with Hendry (1995).

The general-to-specific methodology, initially proposed by Davidson *et al.* (1978), Hendry and von Ungern-Sternberg (1981) and Mizon and Richard (1986), refers to a "top-down" modelling strategy. Song and Witt (2003: 65) explain that,

> "the general-to-specific approach starts with a general autoregressive distributed lag model (ADLM) containing a range of variables suggested by economic theory. This general dynamic model encompasses a number of specific models (simple autoregressive, static, growth rate, leading indicator, partial adjustment, finite distributed lag, dead start, and error correction) and is reduced to these models by imposing certain restrictions on the parameters in the model. The final models are selected on the basis of various restriction tests and diagnostic statistics".

One of the main advantages pointed out by several researchers that apply this methodology is that recent econometric methodologies such as ECM can be used.

4.4. The structural instability of tourism demand: the time varying parameter (TVP) model

Conventional tourism demand modelling uses ordinary least squares, bearing the assumption that the parameters of the models remain constant over the period of analysis, without considering the changes of tourist preferences over time and consequent structural instability of tourism demand.

The TVP model allows for the behavioural change of tourists over time to be considered: the parameters (elasticity's of demand) of the model vary along time. The model enters not only in consideration with external shocks, such as political changes, economic reforms, among others, as well as with the tourists psychological and social changes.

Another advantage of this model is that it can incorporate structural changes in the forecast of tourism demand. Despite their flexibility, there is a large gap in their application.

5. Conclusion

Tourism is one of the most important economic activities for Portugal, and, thus, bears important analytical interest in terms of modelling and forecasting. Although some work has already been done in this respect, a gap in the research and application of recent methodologies and developments on modelling and forecasting tourism demand in Portugal still remains. In particular, the identification and modelling of the main features of these series: nonstationarity, structural breaks, seasonality, as well as the realisation of diagnostic tests, among others, needs to be considered. These important developments and contributions are useful to institutions and decision makers that are directly or indirectly associated to such important activity.

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