Annals of Tourism Research 67 (2017) 1–13

Contents lists available at ScienceDirect

Annals of Tourism Research

journal homepage: www.elsevier.com/locate/atoures

Modelling the interdependence of tourism demand: The global vector autoregressive approach

Zheng Cao [a], Gang Li [a,*], Haiyan Song [b]

[a] School of Hospitality and Tourism Management, University of Surrey, UK
[b] School of Hotel and Tourism Management, The Hong Kong Polytechnic University, Hong Kong Special Administrative Region

ARTICLE INFO

Article history:
Received 6 November 2016
Revised 18 July 2017
Accepted 21 July 2017

Keywords:
Tourism demand
Co-movement
Economic interdependence
Global VAR
Impulse response

ABSTRACT

This study develops a global vector autoregressive (global VAR or GVAR) model to quantify the cross-country co-movements of tourism demand and simulate the impulse responses of shocks to the Chinese economy. The GVAR model overcomes the endogeneity and over-parameterisation issues found in many tourism demand models. The results show the size of co-movements in tourism demand across 24 major countries in different regions. In the event of negative shocks to China's real income and China's tourism price variable, almost all of these countries would face fluctuations in their international tourism demand and in their tourism prices in the short run. In the long run, developing countries and China's neighbouring countries would tend to be more negatively affected than developed countries.

Introduction

International tourism is one of the most important economic activities in an open economy. It enables a country or region to earn substantial foreign exchange, generate employment for local residents and stimulate local economic growth. Thus, the United Nations World Tourism Organization (UNWTO) constantly describes tourism as the key to development, prosperity and well-being (UNWTO, 2013; UNWTO, 2014; UNWTO, 2015). Many key players in international tourism are both top destinations and top source markets, for example, Australia, China, France, Germany, Italy, the UK and the USA. Not surprisingly, the key players are also major world economies, demonstrating the close ties between tourism and economic development. Geographically, the key players are not limited to a single region; they are widely spread across different continents and include not only developed countries in Europe, but also emerging economies such as China and Russia. Hence, engagement in international tourism activities is a global phenomenon.

The modern global economy is characterised by interdependence, which denotes a reciprocal relationship above a certain level of integration between two or more countries. When cross-country interdependence reaches a certain level, as noted by Panić (2003, 8), 'what happens in one group of economies may have a major impact on another group – even when the volume of direct trade between the two is small – through the effect on a third group with which both these groups trade heavily'. International tourism facilitates cross-country connections and integration, as it involves the trading of goods and services, the flow of foreign exchange and the movement of people. As a result, co-movements of macroeconomic performance and international tourism demand can be observed across countries.

* Corresponding author.
E-mail addresses: zheng.cao@surrey.ac.uk (Z. Cao), g.li@surrey.ac.uk (G. Li), Haiyan.song@polyu.edu.hk (H. Song).

http://dx.doi.org/10.1016/j.annals.2017.07.019
0160-7383/

Take, for example, the recent global recession triggered in 2008 by a subprime mortgage crisis in the USA. This recession demonstrates how a country-specific event can have global implications. According to the UNWTO, international tourism started to decline during the second quarter of 2008, and arrivals plummeted by 8% between January and April 2009; the decline was confirmed by a similar drop in worldwide passenger traffic (Papatheodorou, Rosselló, & Xiao, 2010; Smeral, 2010). On the financial front, economic activities in many countries remained subdued by the credit crunch, which restricted the expansion capacity of tourism firms. The world labour market also suffered a downturn, with the worldwide unemployment rate estimated at between 6.5% and 7.4% in 2009 (Papatheodorou et al., 2010).

Given the interdependent nature of the global economy, tourism firms in all destinations are now operating in an increasingly challenging environment. On the demand side, they face highly diverse tourists from different source markets; on the supply side, they encounter fierce competition from neighbouring destinations and further afield from multinational corporations such as hotel chains and airlines that have a physical presence in various locations. As a result, tourism firms are constantly susceptible to a broad range of uncertainties at home and abroad.

Therefore, it is of practical importance to measure the interdependence of tourism demand across countries, so that practitioners can gauge the effect of the external environment and the effect of distant events on their home market. However, quantitative studies of tourism demand tend to focus on the dependent nature of a single origin-destination pair, leaving out the spillover effects on other countries. From the perspective of tourism demand modelling, this limitation is a result of the lack of appropriate econometric models to account for the endogeneity among the variables of a large number of countries. Currently, no quantitative studies have analysed the interdependence of tourism demand across the major countries in the world or simulated the effect of a country-specific shock on tourism demand of other major countries.

This study develops a tourism demand model using an innovative approach called the global vector autoregressive (global VAR, or GVAR) model, which was first introduced by Pesaran, Schuermann, and Weiner (2004) to measure the interdependence of tourism demand in terms of contemporaneous impact elasticities. Recognising China's ascending status in the global economy, this study further examines the effect of shocks to the Chinese economy and simulates the subsequent disruptions to China's top tourism partners.

This study makes several contributions. It represents an initial attempt within tourism research to study the interdependence of international tourism demand at a global level, which is a research direction worthy of greater attention. Methodologically, the study expands tourism demand modelling studies by introducing an innovative system-of-equations technique that overcomes the over-parameterisation issue that can occur when accommodating a large set of endogenous variables in a model.

The rest of the paper is organised as follows. Section 'Economic interdependence of tourism demand' provides the theoretical foundation for understanding the interdependence of tourism demand. Section 'Modelling interdependence' discusses the issues around modelling interdependence and the limitations of common tourism demand models. Section 'The global VAR approach' describes the current study's methodology. Section 'Empirical results and analysis' presents the model estimation results and their interpretation, and Section 'Conclusion' concludes the study with a summary of findings and recommendations.

Economic interdependence of tourism demand

As a major form of trade, international tourism raises or lowers a country's dependence on other countries and is particularly important to developing countries (Jafari, Baretje, & Buhalis, 2000; Stabler, Papatheodorou, & Sinclair, 2010). The economic leakages caused by the outbound tourism demand of residents from developed countries often create a trade deficit in the balance of payments of those countries. Meanwhile, many developing countries receive net monetary inflows as a result of diversifying their industries into tourism or attempting to gain additional tourism receipts by attracting more tourists from abroad (Stabler et al., 2010). Admittedly, a country's trade balance is related to not only tourism demand, but also the trading of other goods and services. For example, tourism-related businesses may rely on imports and receive foreign direct investment as their input factors.

The current study focuses only on the demand side of the tourism sector. The following sections review the reasons for the interdependence of tourism demand across countries globally, and note that one of the implications of interdependence is the co-movement of tourism demand, or more formally the synchronisation of business cycles.

Interdependence and spillover effects

From the perspective of a given country, its economic interdependence on the rest of the world is a measure of how much it *depends on* and *is depended on by* other countries. This can be determined by comparing the country's inbound tourism demand with its outbound tourism demand. That developed countries are more likely to register a trade deficit on their tourism account and developing countries tend to have a trade surplus on the same account indicates how important the tourism sector is to developing countries (Jafari et al., 2000; Stabler et al., 2010).

A country's inbound tourism is linked to the economic situations of other countries and has profound effects on the country's local economy. Briefly, the spending by inbound tourists brings income directly to tourism-related businesses and supports jobs within those businesses. Through the backward links between industries and the re-spending of income, the direct