The nexus of aviation and tourism growth in the South Pacific Region

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ABSTRACT

This study investigates the role of the aviation industry on tourism growth in the South Pacific Region (SPR) by reviewing tourism developments in the Cook Islands, Fiji, Samoa and Tonga. The panel two-stage least squares (2SLS) model is applied to analyse tourists from Australia and New Zealand into the sampled countries. The findings suggest that the aviation industry positively influences tourists travelling into the region. Tourism demand in the region is not very sensitive to income level of source markets. Our study justifies government support for the SPR's aviation sector, and calls for regional cooperation between the aviation and tourism sectors.

1. Introduction

The aviation industry is one of the cornerstones of global economic development; for example, it had a total global economic impact of US$2.7 trillion in 2016 (International Civil Aviation Organisation, 2019). The aviation sector's role as a primary catalyst for the growth of the tourism industry has been well recognised (Forsyth, 2006; Palhares, 2003). The United Nations World Tourism Organisation (2015) reported that the majority of tourists prefer to travel via air transport as it becomes more affordable, efficient and accessible. Hence, sustained developments of the aviation industry, such as aviation liberalisation and the emergence of low-cost carriers (LCCs), is expected to substantially promote tourism demand and growth (Dimitriou, Mourmouris & Sartzetaki, 2017).

The aviation industry is argued to be a vital catalyst for economic growth in developing countries (e.g., Bråthen & Halpern, 2012; Button & Yuan, 2012; Fageda et al., 2018; Smyth, et al., 2012; Taumopeau, 2014). The South Pacific Region (SPR) comprises a number of small island countries with emerging economies, limited natural resources and relatively small populations that are scattered across the world's largest ocean, the Pacific Ocean. Tourism plays a vital role for the SPR economies and their service export industries. For example, tourism-related activities contributed about 86.99% of the Cook Islands' economy, whereas tourism earnings contributed about 38.9% to Fijian GDP as of 2018 (South Pacific Tourism Organisation, 2018). These SPR countries' geographic isolation suggests that the aviation industry plays a critical role for the region's development of the tourism industry. However, this particular situation presents a paradox, as SPR countries rely heavily on the tourism industry for economic growth but their aviation industry continues to struggle to grow (e.g., Cheer et al., 2018; Craig-Smith, 1996; Kissling, 2014; Stanley, 2000). Importantly, the benefits of the tourism industry to the SPR's economies are yet to be fully explored (Purcell & Scheyvens, 2015).

The SPR presents a unique case in comparison to the highly researched markets in developed countries such as Australia, South Korea, the United Kingdom (UK) and the United States (US), and developing countries with large aviation markets such as China and Brazil. The SPR is geographically isolated from other international tourism markets, and there is no real substitute transportation mode to aviation for international tourists (Prideaux & McNamara, 2013). Likely due to their relatively small market size, there is a dearth of empirical research on the SPR region. Prior published articles are mostly descriptive, with few quantitative studies that have examined the relationship between air transport and tourism in the SPR (Forsyth & King, 1996; Cheers et al., 2018; Taumoepeau, Towner & Loosekoot, 2017). This leaves not only gaps in academic research but also prevents governments and other stakeholders from designing the most effective policies to promote growth in the tourism and aviation sectors. This study aims to contribute to a better understanding of these important issues by focusing on the following two research questions:

- *What are the key determinants of tourism growth in the SPR?*

- *What are the best policy options that would support the sustained growth of the aviation and tourism sectors in the SPR?*

This is achieved by empirically quantifying the effects of the aviation industry on tourism growth for the SPR using actual industry data. Such a study contributes to both the air transport and tourism literature, and also facilitates evidence-based policymaking in the following ways. First, our study is among the first quantitative empirical studies on the interactions of air transport and tourism development within the SPR. Based on historical industry data, the findings of this study are expected to provide sound, pragmatic and practical insights to policymakers and industry stakeholders (i.e., government officials, regional organisations, executives of airlines and tourism authority and operators). Second, in conjunction with the empirical analysis, we will document and examine the problems and opportunities faced by the aviation and tourism sectors within the SPR, which face continuing challenges and a significant shortage of rigorous research (Lawson, 2017). More importantly, our study on this severely understudied region (the SPR) contributes to the International Civil Aviation Organisation's initiative known as the No Country Left Behind. A notable contributing factor to the limited number of empirical studies within the SPR is the limited access to public data (Jayaraman, 2006). Our investigation thus paves the way for more studies that extend our analysis further. Furthermore, this study on the impacts of the SPR's aviation industry on tourism growth in the selected countries (i.e., the Cook Islands, Fiji, Samoa and Tonga) examines the cases of different levels of economic development (i.e., more developed economies, mid-level economies and low-level economies within the SPR) and thus contributes to a general assessment of the region's future prospect.

The rest of this paper is structured as follows: Section 2 presents a literature review of the relationship between aviation and tourism, and the factors influencing tourism growth. Section 3 provides an overview of air transport and tourism development in the SPR countries, namely the Cook Islands, Fiji, Samoa and Tonga. Section 4 presents a description of the data and the methodology (the panel two-stage least squares (2SLS) model), which allows us to quantify the impacts of the aviation sector on inbound tourists for the Cook Islands, Fiji, Samoa and Tonga. Section 5 presents and discusses the empirical findings. Section 6 discusses the policy implications of the empirical findings; finally, Section 7 summarises and discusses the limitations and future research areas arising from this study.

2. Literature review

This section reviews previous studies on aviation and tourism so that their key findings can be summarised and research gaps can be identified. Firstly, it provides an overview of the aviation and tourism literature, followed by a review of aviation factors and other key economic drivers impacting tourism demand from a global perspective. Finally, it focuses on the determinants of tourism demand from the SPR's perspective.

2.1 Aviation and tourism

Extant research supports the notion that the aviation and tourism industries are mutually dependent (e.g., Bieger & Wittmer, 2006; Dimitriou, Mourmous & Sartzetaki, 2017; Duval, 2013; Forsyth, 2006; 2008; Lohmann & Duval, 2015). Previous studies have explored the significant linkages between the aviation industry and tourism growth in terms of connectivity, distance, transportation costs and liberalisation policies (Bieger & Wittmer, 2006; Forsyth, 2008), the effects on tourism growth in terms of the number of inbound tourists by air, the effects of route development on the growth of the aviation industry, and the implications of government subsidy policies (Morley, 2003; Wittman, 2014; Wittman, Allroggen & Malina, 2016).

The positive relationship between the aviation industry and economic growth, as well as between the tourism industry and economic growth, are well documented (e.g., Alsumairi & Tsui, 2017; Button & Yuan, 2012; Hu et al., 2015; Tolkack, Chon & Xiao, 2016; Wu, 2016). However, comparatively fewer studies have paid attention to examining the direct relationships between aviation and tourism. Indeed, Duval (2013) and Landre and Peeters (2011) argued that direct interactions between aviation and tourism are still in their infancy within academic scholarships. A recent systematic literature review conducted by Spasojevic, Lohmann, and Scott (2018) concluded that there is a lack of literature on the direct interactions between aviation and tourism. Their study analysed the Australian Business Deans Council (ABDC) journals published between 2000 and 2014 and found that only limited published research on aviation and tourism focused on aspects such as air route development, passenger experience and the impact of LCCs. Recent studies have also extended their focus to the effects of tourism destinations (i.e., non-commercial routes or peripheral destinations) and government subsidies (Fageda et al., 2018; Law, 2017).

However, a few recent aviation and tourism research-based studies have touched on emerging and developing countries. Nevertheless, the SPR countries have rarely been the focus, probably because of their limited market size and roles in the global market (Dobruszkes & Graham, 2016; Hakim & Merkert, 2019; Saranga & Nagpal, 2016). This study aims to fill this gap in research with an empirical study for the SPR region.

2.2 Aviation factors and key economic factors tourism industry – the global perspective

From a global perspective, the impact of the aviation industry on the tourism industry has empirically analysed, and studies have considered several aviation factors (i.e., aviation liberalisation, route seat capacity and/or frequency, the emergence of LCCs) and other key economic factors (i.e., cost of transportation, tourist income, tourism prices and exogenous impacts) (e.g., Barros & Wanke, 2015; Duval & Schiff, 2011; Wu, 2016). However, there are inconsistencies in the results on the significance of each factor on tourism, possibly due to the different samples and timeframes used across the studies.

2.2.1 Aviation liberalisation policies and LCCs

A significant body of literature has argued that there is a link between tourism growth and demand and aviation liberalisation policy or an open-market concept (e.g., Donzelli, 2010; Forsyth, 2006; Graham & Dennis, 2010; Rey, Myro & Galera, 2011). The ramifications of an open-market concept or liberalisation policies on the airline industry have lifted restrictions on flight accessibility (destinations), capacity (aircraft size), frequency (schedules) and airfares, which has led to increased market competition and service quality, which naturally attract new tourists (Duval, 2013). Additionally, the liberalisation policies increased competition among airlines. This had resulted in lower airfares and higher service quality, which have positively influenced international tourists (Gillen & Hazledine, 2015). Airline competition is often measured by the Herfindahl–Hirschman Index (HHI), which is a market concentration indicator derived from airlines' market shares (Bamberger, Carlton & Neumann, 2004).

Another outcome of liberalisation policies has been the emergence of LCCs into the aviation industry (Doganis, 2002; Fu, Oum & Zhang, 2010, Fu et al., 2015b). Indeed, substantial attention has been focused on the impact of LCCs on the tourism industry (e.g., Alsumairi & Tsui, 2017; Dobruszkes, Mondou & Ghedira, 2016; Graham & Dennis, 2010; Tsui, 2017; Zhang & Lu, 2013). Conceptually, LCCs provide lower airfares and more frequent point-to-point air services, which have appealed to more price-sensitive tourists, consequently increasing tourism growth and demand (Alguilo et al., 2007). Previous studies have suggested that the introduction of LCCs is one of the critical drivers of tourism demand (e.g., Chung & Whang, 2011; Fu, Dresner & Oum, 2011; Fu et al., 2015a; Halpern & Graham, 2015). Similar results were reported in studies on other countries in Africa (Njoya, 2016), Europe (Alvarez-Diaz, Gonzalez-Gomez & Otero-Giraledez, 2019; Donzelli, 2010; Rey, Myro & Galera, 2011; Vieira et al., 2019), New Zealand (Tsui, 2017) and South Korea (Young & Whang, 2011). Additionally, the introduction of the LCCs positively impacted on the tourism industry as it introduces robust competition to full-service carriers (FSCs) (Fu et al., 2015a; Khan, Kim & Kim, 2018; Khan et al., 2019). For example, two recent studies (Khan, Kim & Kim; 2018; Khan et al., 2019) investigated the impact of LCCs on South Korean tourism and its airline industry. Both studies found the impact of LCC in promoting South Korean tourism industry and the competitive dynamics between LCCs and FSCs in South Korea have evolved over time. In contrast to these studies, other studies of other countries found no evidence of any significant impact of LCCs on the influx of international tourists, notably Australia (Forsyth, 2003; Zhang, 2015), the UK (Civil Aviation Authority United Kingdom, 2006; Clave et al., 2015) and the Atlantic region (Hunt & Tryong, 2019). In general, there seems to be no conclusive evidence in the empirical literature on the impacts of the emergence of LCCs on tourism. In the context of South Korea, Khan, Kim and Kim (2018) argued that different results of the impacts of LCCs on the tourism industry are due to the evolution of the competition between the LCCs and the FSCs.

2.2.2 Key economic factors

A significant body of literature has argued that the essential determinants of tourism growth and demand are socio-economic factors (Hakim & Merkert, 2019; Zhang, 2015) and geo-economic factors (Wang & Song, 2010). Other studies also argued that key economic

determinants of tourism demand might include gross domestic product (GDP) per capita or income (Fraser & McAlevey, 2015; Garnin-Munoz, 2009; Zhang, 2015), population size and location elements (Dobruszkes, Lennert & Hamme, 2011), tourism price components and exchange rates (e.g., Duval & Schiff, 2011; Naude & Saayman, 2005; Prideaux, 2000; Schiff & Becken, 2011; Zhang, 2015).

The impact of income on tourism growth and demand had been the subject of much research (Duval & Schiff, 2011; Naude & Saayman, 2005; Zhang, 2015). Conceptually, the income factor, measured by GDP per capita of the country of origin, directly influences the ability of tourists to pay for tourism activities. Consequently, when income increases, this will positively impact on the number of tourists (Hu et al., 2015).

Extensive studies have been carried out on the impact of tourism prices on tourism growth and demand (Duval & Schiff, 2011; Narayan, 2004; Tsui et al., 2019). Wang and Song (2010) also provided a comprehensive literature review on studies published between 1950 and 2008, and found that tourism prices (including accommodation, food and wine) had a significantly negative impact on tourism growth and demand. Because of the unavailability of tourism-related prices, many previous studies have relied on various proxies to represent tourism prices. For instance, the exchange rate between the country of origin and country of destinations has been used as a proxy for tourism-related prices (Santana-Galleo, Ledesma-Rodriguez & Perez-Rodriguez, 2010; Zhang, Wang & Fu, 2017). Countries with a higher exchange rate are deemed to be less desirable destinations for international tourists (Khandaker & Islam, 2017).

Several studies have highlighted the vital role that transport prices (air, land and sea) play on tourism growth and travel demand (Borenstein & Rose, 2014; Lim, 1999; Naude & Saayman, 2005). Consequently, increasing transport prices will negatively impact the tourism industry (Efthymiou & Papatheodorou, 2015; Hakim & Merkert, 2019). Most studies acknowledged the sensitivity of information on transport costs, which has resulted in the majority of studies using aviation fuel price as a proxy (e.g., Hakim & Merkert, 2019; Mohammadian et al., 2019; Oum, Fu & Yu, 2005; Zhang, 2015). Aviation fuel prices drive costs of airline operations and airfares upwards, which adversely impact tourism demand (Wensveen, 2007), although at least one conflicting result showed that jet fuel price variable did not significantly influence international tourist numbers into Australia (Zhang, 2015).

Studies have also explored the role of location elements and the distance factor on tourism growth and demand (Dobruszkes, Lennert & Hamme, 2011; McKercher, Chan & Lam, 2008; McKercher & Lew, 2003). The flight distance is found to adversely and significantly impact tourism demand. Dobruszkes, Lennert and Hamme (2011) found that distance was the major impediment for international tourists into European urban regions. However, conflicting results were presented by Koo et al. (2017), which found that additional air services to remote destinations may increase tourism demand.

In addition, several studies analysed the consequences of unexpected events or exogenous shocks on tourism demand (Hofer, Dresner & Windle, 2009; Morrell, 2011; Tsui, Gilbey & Balli, 2014), such as the global financial crisis 2008/09 (Franke & John, 2011; Alegre & Sard, 2015), the September 11th 2001 terrorist attacks (Mantin & Wang, 2012; Weensveen, 2007),

the severe acute respiratory syndrome outbreak in 2003 (Flouris & Walker, 2005) and other unexpected global challenges have drastically impacted the affordability of air travel and passengers' motivation to travel.

Overall, most of the previous literature on aviation and tourism has focused on developed economies and large countries such as Australia, Europe, South Korea, New Zealand, Singapore, the UK and the US (Dobruszkes & Graham, 2016; Wang & Song, 2010). Recently, researchers had attempted to minimise this gap, by including developing countries such as China, India and African nations in their analysis (Barros & Wanke, 2015; Hakim & Merkert, 2019). Additionally, Naude and Saayman (2005) suggested that different factors impact tourism demand and highlighted that as market demand continues to evolve, so do the factors impacting on tourism demand.

2.3 Aviation and socio-economic factors impacting on tourism: the SPR's perspective

Prior studies on the SPR (e.g., Forsyth & King, 1996; Guthrie, 2013; Taumoepeau & Kissling, 2008; Taumoepeau, Towner & Losekoot, 2017) highlighted the importance of the air transport sector in supporting the growth of the tourism industry and economic growth within the region. The characteristics of the SPR include small island countries with small emerging economies, limited natural resources and small populations that are scattered across the world's largest ocean, the Pacific Ocean, as specified in Table 1 (e.g., Forsyth & King, 1996; Guthrie, 2013; Kissling, 2014; Taumoepeau & Kissling, 2008).

Table 1. Information of South Pacific Region countries

South Pacific countries	Land size (km^2)	Population (2017) (thousands)	GDP (2017) (US$ million)	Income group
American Samoa	199	55.64	634	Low middle
Cook Islands	240	Not available	Not available	Lower middle
Fiji	18,272	905.50	5061.20	Upper middle, Low middle
French Polynesia	3,660	283.01	Not available	Not available
Kiribati	811	116.40	185.57	Lower middle
Micronesia	701	105.54	336.43	Lower middle
Nauru	21	13.65	113.88	Middle
New Caledonia	18,575	280.46	Not available	Not available
Niue	260	1.719	Not available	Not available
Papua New Guinea	452,860	8215.16	20,536.31	Not available
Samoa	2,934	196.44	840.93	Upper middle
Solomon Islands	27,540	611.34	1303.45	Lower middle
Tonga	718	108.02	427.66	Upper middle, Low middle
Tuvalu	26	11.19	39.73	Low middle
Vanuatu	12,200	276.24	862.88	Lower middle

Source: World Bank database website.

Taumoepeau, Towner and Losekoot (2017) argued that such a small population market is heavily dependent on international tourist arrivals to support the region's airline and tourism industries. Additionally, the relative remoteness of the SPR poses an extra challenge for regional connections over the vast distances between islands throughout the SPR (Duval & Winchester, 2011; Forsyth & King, 1996). Furthermore, the SPR is relatively isolated from the

global tourism markets, and most of international visitor arrivals are by air (Taumoepeau, 2010). Being located in the peripheral regions results in thin markets associated with high transport costs, which have affected the SPR's tourism (Scheyvens & Russel, 2009). In the past, the SPR's governments tried to provide financial subsidies (monetary contributions) to support non-commercial routes with anticipated benefits through the tourism industry (Hazledine & Collins, 2011). For instance, the government of the Cook Islands injected NZ$5 million as financial subsidies to Air New Zealand for potential tourism earnings of NZ$33 million from connecting the Cook Islands to the US.

Previous literature has also argued that the airline industry in the SPR has struggled to grow and their operational difficulties have negatively impacted the growth of the tourism industry (Douglas & Douglas, 1996; Kissling, 2014). Most SPR-based airlines only operate domestically, except for Fiji, Papua New Guinea and Samoa. The aviation market between the SPR and the rest of the world has been dominated by foreign airlines from Australia and New Zealand (Hazledine & Collins, 2011), although a few local carriers such as Fiji Airways also play some important roles in selected routes. Consequently, most of inbound tourists to the SPR originate from Australia and New Zealand, which are the closest tourist source markets to the SPR (Pearce, 2002; Scheyvens & Russel, 2009). The substantial influx of tourists from Australia and New Zealand was suggested by Cheer et al. (2018), which also reflects the colonisation factor and previous histories.

The small island countries in the SPR are highly vulnerable to natural disasters, which contributes to the demand seasonality of the industry (Milne, 1992). For instance, exogenous shocks such as the political coup in Fiji and the Zika virus in the SPR negatively impacted the tourism industry in 2006.

In contrast to the global perspective, the SPR's air transport sector has restricted liberalisation schemes and policies (Kissling, 2014; Taumoepeau & Kissling, 2013). However, Taumoepeau (2014) and Taumopeau, Towner and Losekoot (2017) argued that the LCC model would significantly impact tourism demand in the SPR and further suggested that a hybrid LCC would be more suitable. These are the salient factors that had been raised by the minimal literature available on the SPR.

Overall, there is insufficient literature on the interactions between air transport and tourism in the SPR. Although many comments in prior literature seem to be intuitive and insightful, few empirical studies have been conducted in the region to test and validate hypotheses of the link between aviation and tourism. In the meantime, the SPR's tourism continues to receive at least 1% of the global tourism industry, which is a fairly large number, considering the region's very small population and economies. Aviation and tourism are of critical importance to the SPR, which presents a compelling case that needs closer examination and analysis. The following section provides an overview of the SPR's major economies and serves as a background and justification for the model specifications in Section 4.

3. Overview of the aviation and tourism sectors of the Cook Islands, Fiji, Samoa and Tonga

This section provides an overview of four SPR countries selected in this study: the Cook Islands, Fiji, Samoa and Tonga. These four countries represent different levels of economic development within the SPR and, more importantly, an analysis of these four countries may provide a good representation of the SPR.

3.1 Cook Islands

The Cook Islands is one of the smallest countries within the SPR, with a population of approximately 17,000 in 2016. It comprises 15 small islands with a landmass of about 237 km^2. There is only one main gateway to the Cook Islands: the Rarotonga International Airport, which can handle Boeing B747s, with a 2300m paved runway. There are only four countries offering direct air connections into the Cook Islands from Australia (Sydney), New Zealand (Auckland), the US (Los Angeles) and Tahiti (Papeete) It is served by foreign-based airlines, including Air New Zealand, Air Tahiti, Jetstar and Virgin Australia. Air New Zealand dominates (i.e., 25% of total available seat kilometres (ASKs) from Australia and New Zealand) flight connections to and from the Cook Islands, whereas the national carrier (Air Rarotonga) provides only domestic services. The Cook Islands are relatively isolated with limited connectivity to key global markets.

The majority of international inbound tourists choose and prefer to travel by air to visit the Cook Islands. In 2018, the total visitor arrivals by air reached 168,760, which was approximately 10 times its population. The majority of visitors by air were mainly from New Zealand, which accounted for 68% of total visitor arrivals. Australia followed this with 16% of total visitor arrivals. In 2018, 71% of inbound visitors by air travelled to the Cook Islands for vacation purposes and visiting family and friends living in the Cook Islands. The majority (41%) of visitors stayed in paid accommodation (i.e., hotels and motels) and 15% stayed in private accommodation. In the same year, the total contribution of the Cook Islands' tourism industry to its GDP accounted for 86.99%, which is the highest in the SPR (South Pacific Tourism Organisation, 2018).

3.2 Fiji

Fiji is one of the most prominent island countries in the SPR and has the second-highest GDP within the region. Fiji consists of 333 small islands spread across 18,274 km^2. Fiji has the most direct connectivity to key global markets. The main gateway to Fiji is Nadi International Airport in the island of Viti Levu, which can cater for the largest commercial aircraft such as Airbus A380s.

There are various direct flight connections to Fiji, including Australia (Brisbane, Melbourne and Sydney), New Zealand (Auckland, Christchurch and Wellington), Hong Kong, Hawaii, Singapore, and the US (Los Angeles and San Francisco). These international routes are currently served by 10 international airlines that provide direct air services to and from Fiji,

including Air Caledonie, Air New Zealand, Air Niugini, Air Vanuatu, Fiji Airways, Jetstar, Korean Air, Qantas Airlines, Our Airline, and Virgin Australia. International air connectivity to Fiji is dominated by Fiji Airways, Fiji's national carrier (i.e., 30% of total ASKs from Australia and New Zealand). Fiji Airways is also dominating air services within the SPR.

Most international tourists arrived in Fiji by air in 2018. Fiji is the largest tourist destination in the SPR and has one of the highest numbers of tourists per capita in the world (Cheer et al., 2018). In 2018, the total number of visitors by air to Fiji was 870,309, which was a 3.3% increase from 2017. In 2018, inbound visitors by air were mainly from Australia (45.74%), followed by visitors from New Zealand (20.21%). During the same year, 75% of inbound visitors by air came for vacation purposes, followed by 9% for visiting family and friends. In addition, Fiji is the only South Pacific location with some of the world largest multinational hotel chains, such as the Sheraton Fiji, Hilton Fiji Beach Resort & Spa, Sofitel Fiji Resort, and Spa and Shangri La Fiji Resort. The majority of visitors to Fiji choose to stay in paid accommodation (i.e., hotels and motels). In the same year, the total contribution of Fiji's tourism industry to its GDP accounted for 38.90% (South Pacific Tourism Organisation, 2018).

3.3 Samoa

Samoa is one of the medium-sized economy countries within the SPR, with a population of approximately 196,000. Samoa is made up of 12 islands spread over 2,842 km^2 of the Pacific Ocean. The main gateway to Samoa is Faleolo International Airport, which can cater to commercial jet operations with a 3000m asphalt runway. There is limited international flight connectivity to Samoa. There are only four countries offering direct air connections to Samoa: Australia (Brisbane, Melbourne, Sydney and Townsville), American Samoa, Fiji (Nadi) and New Zealand (Auckland). Five international airlines provide international air services to and from Samoa, including Air New Zealand, Fiji Airways, Samoa Airways, Talofa Airways, and Virgin Australia. Its international air connectivity is dominated by Air New Zealand (with 22% of total ASKs from New Zealand and Australia), despite having a national carrier, Samoa Airways.

International tourists by air accounted for approximately 97.2% of Samoa's total inbound international tourists in 2018, reaching 172,496 visitors. New Zealand was the leading tourist source country, with approximately 47% of its total visitor arrivals by air during the same year. This was followed by 21% from Australia. As of 2018, 44% of visitors by air travelled to Samoa to visit their family and friends, and 35.6% were for the sole purpose of vacations and holidays. The majority (57.7%) of visitors stayed in unpaid accommodation and 38% stayed in paid accommodation (i.e., hotels and motels). In the same year, the total contribution of Samoa's tourism industry to its GDP accounted for 30.42% (South Pacific Tourism Organisation, 2018).

3.4 Tonga

Tonga is also one of the medium-sized economy countries within the SPR, with a population of about 103,252. It contains 176 small islands that spread across 748 km^2 of the South Pacific Ocean. The main gateway to Tonga, Fua'amotu International Airport, can accommodate larger aircraft such as Boeing B787s, with a 2681m asphalt runway. There is limited international flight connectivity to Tonga, with only direct air links from Australia (Sydney), Fiji (Nadi, Suva), New Zealand (Auckland) and Samoa (Faleolo). There are five international airlines that provide direct air services to and from Tonga, including Air New Zealand, Fiji Airways, Real Tonga Ltd, Talofa Airways, and Virgin Australia. Its international air connectivity is dominated by Air New Zealand with 44% of total ASKs from Australia and New Zealand.

International tourists by air accounted for approximately 73.4% of total inbound international tourists to Tonga in 2018, reaching 58,130 visitors. New Zealand was Tonga's leading tourism source market, which took a share of 46.8% of its total inbound visitors by air. New Zealand was followed by 19.2% of inbound visitors by air from Australia. In 2018, 53.4% of inbound visitors by air travelled to Tonga to visit family and friends, and 33.1% came for vacation and holiday purposes. In the same year, the contribution of Tonga's tourism industry to its GDP accounted for 25.35% (South Pacific Tourism Organisation, 2018).

Overall, the aviation and tourism sectors play vital roles for these four major SPR countries' economies, and their performance and growth are key determinants of the economic development and social welfare of these sampled countries.

4. Data & Methodology

Econometric analysis had been widely adopted by various aviation and tourism studies (e.g., Albayrak, Ozcan, & Dobruszkes, 2020; Allen & Yap, 2009; Tsui, 2017; Tsui, Hasan & Balli, 2017; Wang et al., 2017; Wang et al., 2020a, b). In the context of the SPR, Narayan et al. (2010) used econometric analysis to investigate the impact of the tourism growth in the economic development of Fiji, Tonga, the Solomon Islands and Papua New Guinea. In addition, the panel data approach and/or 2SLS model have been used in various aviation and tourism studies (e.g., Baltaci, Sekmen, & Akbulut, 2015; Boonekamp, Zuidberg & Burghouwt, 2018; Rey, Myro & Galera, 2011; Tsui,2017; Tsui, Tan & Shi, 2016). For instance, Rey, Myro and Galera (2011) used the dynamic panel data approach to investigate the effects of the emergence of LCCs on the tourism market in Spain. This analysis was based on the number of inbound tourists from the 15 EU States for the period 2000 to 2009. Similarly, Baltaci, Sekmen and Akbulut (2015) estimated a 2SLS regression model with panel data to investigate the impact of airport activity and traffic frequency on 26 subregions in Turkey between 2004 and 2011. The 2SLS regression model has also been used to provide a deep understanding of the impact of the LCCs on the domestic tourism demand within New Zealand based on panel data from five regions for the period of June 2009–July 2015 (Tsui, 2017). Additionally, the determinants of air demand for European countries for the year 2010 was examined using the 2SLS model, which led to the finding that LCCs significantly influenced tourism demand for European countries (Boonekamp, Zuidberg & Burghouwt, 2018). In terms of the methodological contribution of this study, the panel 2SLS regression model can accurately quantify the effects of the aviation

industry and the key socio-economic factors on the tourism industry in the SPR, notably on tourism demand and growth in the four major SPR countries. This model enables the empirical model to provide a robust estimation with a good control of potential endogeneity, which could have confounded the causal relationship between air transport activity and tourism demand, an issue repeatedly cautioned by previous studies (e.g., Baltaci, Sekmen, & Akbulut, 2015; Boonekamp, Zuidberg & Burghouwt, 2018; Tsui, Tan, Shi, 2016; Tsui, 2017).

4.1 Data sources

Collating relevant data for the SPR markets has always been a challenge (Schiff, 2014). With repeated efforts via different channels, we collected two balanced panel datasets of inbound tourists from Australia and New Zealand to four selected SPR countries: the Cook Islands, Fiji, Samoa and Tonga. Although some data were also available for analysing other smaller SPR countries, they were either incomplete or inconsistent across time. To ensure the reliability of the estimation and econometric results, we decided to restrict our focus to datasets that were of higher quality in this study. The panel dataset of the four selected SPR countries covered from January 2008 to December 2018 and was assembled from a variety of sources (see Table 2). It should be noted that the number of international tourists from Australia and New Zealand to the four SPR countries followed the United Nations World Tourism Organisation's (2015) definition, which includes any visitors that stop for more than one night in a country in which they are not a resident.

4.2 Model specifications and econometric method

Prior literature collectively supports the notion that the aviation industry significantly supports international tourism demand and growth, but there is a lack of empirical evidence in the SPR, which has some unique features as discussed above. Previous studies (Leitao, 2009; Mervan & Payne, 2007; Witt & Witt, 1995) have measured tourism growth and demand by tourist arrivals, which we followed in this study. This study further specifies tourism demand and growth as functions of the following variables: ASKs of all scheduled airlines between the Cook Islands, Fiji, Samoa and Tonga, and their two main tourism source markets (Australia and New Zealand); GDP per capita for the origins (Australia and New Zealand) (a proxy for tourists' income); GDP per capita for the destinations (the Cook Islands, Fiji, Samoa and Tonga), which serves as a proxy to control for travel propensity, as well as aviation fuel prices (a proxy for transport costs); exchange rates (a proxy for tourism prices for accommodation, food and beverages at the destinations); exogenous shock variables (i.e., $Samoa/Tonga\ tsunami_{jt}$, $GFC\ 2008/09_{jt}$, $Cyclone\ Winston\ (Cat\ 5)_{jt}$ and $Cyclone\ Gita\ (Cat\ 5)_{jt}$); the impact of LCCs on the SPR's tourism and the flying distance (measures the travel distance or remoteness of the SPR for international inbound tourism). The definitions and sources of the variables of interest are presented in Table 2.

The model specified in Equation (1) is established to empirically investigate the impacts of various factors on tourism demand in the SPR (in the contexts of the Cook Islands, Fiji, Samoa, and Tonga), using the balanced panel data collected for the period of 2008–2018.

$$\ln(Inbound\ \ tourists)_{ijt} = \beta_0 + \beta_1 \ln(ASK)_{ijt} + \beta_2 \ln(Aviation\ fuel\ price)_t + \beta_3 \ln(GDP\ per\ capita)_{it} + \beta_4 (Exchange\ rate)_{ijt} + \beta_5 (Samoa/Tonga\ tsumani)_{jt} + \beta_6 (GFC\ 2008/09)_t + \beta_7 (Cyclone\ Winston\ (Cat\ 5))_{jt} + \beta_8 (Cyclone\ Gita\ (Cat\ 5))_{jt} + \beta_9 (LCC\_share)_{ijt} + \beta_{10} \ln(Distance)_{ijt} + \varepsilon_{ijt} \quad (1)$$

where the subscripts *i* and *j* denote the origin and destination, respectively; *t* denotes month *t*; β_s represents the coefficients of the explanatory variables and ε_{ijt} is the error term.

Apart from the four exogenous shock variables (*Samoa/Tonga tsunami*$_{jt}$, *GFC 2008/09*$_t$, *Cyclone Winston (Cat 5)*$_{jt}$ and *Cyclone Gita (Cat 5)*$_{jt}$), *LCC_share*$_{ijt}$ and *Exchange rate*$_{ijt}$, all other variables of interest were converted into logarithmic form. All the coefficient estimates of the variables in logarithmic form can be conveniently interpreted as elasticities. The Stata Version 15 software package was used for estimation. Table 3 provides a descriptive summary of all the variables of interest included in this study. The balanced panel dataset covers a fairly long period, overall, there was sufficient variance and heterogeneity across the sample, which justifies the validity of the sample.

Table 2. Definitions and source of variables of interest (2008–2018)

Time series and variables	Definitions	Data source
$\ln(Inbound\ tourists)_{ijt}$	The natural logarithm of the number of tourists and visitors for routes from origin *i* (Australia or New Zealand) to destination *j* (the Cook Islands, Fiji, Samoa and Tonga) in month *t*	Ministry of Finance & Economics Development – the Cook Islands; Samoa Bureau of Statistics; South Pacific Tourism Organisation; Tonga Statistics Department
$\ln(ASK)_{ijt}$	The natural logarithm of available seat kilometres (ASKs) scheduled by airlines between origin *i* (Australia or New Zealand) and destination *j* (the Cook Islands, Fiji, Samoa and Tonga) in month *t*	Calculated by authors from the Official Airline Guide (OAG) data
$\ln(Aviation\ fuel\ price)_{t}$	The natural logarithm of the average U.S. Gulf Coast kerosene-type jet fuel price per gallon in month *t* (in USD)	U.S. Energy Information Administration
$\ln(GDP\ per\ capita)_{it}$ [a]	The natural logarithm of gross domestic product (GDP) per capita for origin *i* (Australia or New Zealand) in month *t* (local dollars: AUD & NZD)	World Bank data website; Statistics New Zealand; Australian Bureau of Statistics
$Exchange\ rate_{ijt}$	The exchange rates between origin *i* (Australia or New Zealand) and destination *j* (the Cook Islands, Fiji, Samoa and Tonga) currency in month *t*.	Ministry of Finance & Economics Development – the Cook Islands; Reserve Bank of Fiji; Samoa Bureau of Statistics; Tonga National Reserve Bank official websites
$Samoa/Tonga\ tsunami_{jt}$	A binary variable that takes 1 for the period of the first Samoa/Tonga tsunami in September 2009 and 0 otherwise	Official government websites
$GFC\ 2008/09_{t}$	A binary variable that takes 1 for the period of the global financial crisis in 2008/09 and 0 otherwise	Calculated by authors
$Cyclone\ Winston\ (Cat\ 5)_{jt}$	A binary variable that takes 1 for the period of the Gita Category 5 cyclone in Fiji 2016 and 0 otherwise	Official government websites
$Cyclone\ Gita\ (Cat\ 5)_{jt}$	A binary variable that takes 1 for the period of the Gita Category 5 cyclone in Tonga 2018 and 0 otherwise	Official government websites
LCC_share_{ijt}	The share of scheduled seats by LCCs for origin *i* (Australia or New Zealand) and destination *j* (the Cook Islands, Fiji, Samoa and Tonga) in month *t* (in percentage)	Calculated by authors from the OAG data
$\ln(Distance)_{ijt}$	The natural logarithm of the average flying distance between airports in origin *i* (Australia or New Zealand) and airports in destination *j* (the Cook Islands, Fiji, Samoa and Tonga) in month *t* (in km)	Calculated by authors from the OAG data
$\ln(HHI)_{ijt}$	Airline market competition measured by the Herfindahl–Hirschman Index (HHI), which is computed from ASKs of scheduled airlines between origin *i* (Australia or New Zealand) and destination *j* (the Cook Islands, Fiji, Samoa and Tonga) in month *t*	Calculated by authors from the OAG data

Remark: [a] The monthly GDP per capita was interpolated and converted from the annual GDP per capita.

Table 3. Descriptive summary of variables of interest (January 2008–December 2018)

Time series and variables	Australia					New Zealand				
	Obs	Mean	Std. Dev	Min	Max	Obs	Mean	Std. Dev	Min	Max
$\ln(Inbound\ tourists)_{ijt}$	528	8.013	1.347	5.976	10.516	528	8.501	0.728	6.841	12.303
$\ln(ASK)_{ijt}$	490	16.849	1.473	14.851	19.501	528	17.8001	0.836	15.823	19.251
$\ln(Aviation\ fuel\ price)_{t}$	528	0.757	0.341	-0.073	1.357	528	0.757	0.341	-0.073	1.357
$\ln(GDP\ per\ capita)_{it}$	520	10.936	0.143	10.6	11.142	528	10.545	0.141	10.232	10.717
$Exchange\ rate_{ijt}$	528	0.712	0.278	0.404	1.360	528	0.763	0.172	0.5026	1.053
$Samoa/Tonga\ tsunami_{jt}$	528	0.006	0.075	0	1	528	0.004	0.0615	0	1
$GFC\ 2008/09_{t}$	528	0.163	0.370	0	1	528	0.114	0.318	0	1
$Cyclone\ Winston\ (Cat\ 5)_{jt}$	528	0.002	0.044	0	1	528	0.002	0.0435	0	1
$Cyclone\ Gita\ (Cat\ 5)_{jt}$	528	0.002	0.044	0	1	528	0.002	0.0435	0	1
LCC_share_{ijt}	528	15.647	33.793	0	100	528	4.945	10.293	0	53.204
$\ln(Distance)_{ijt}$	528	8.283	0.154	1.101	2.481	528	7.847	0.161	7.603	8.011

- ***Multicollinearity and Panel data unit root test***

The multicollinearity and panel data unit root tests were conducted to ensure that the estimation for the model was robust. The multicollinearity test was applied to all the explanatory variables of interest (Alsumairi & Tsui, 2017; Pevalin & Robson, 2009; Wooldridge, 2014). The variance inflation factor (VIF) results showed there were no significant correlations amongst the explanatory variables in the dataset (see Table 4).

Table 4. Multicollinearity test results (variance inflation factor (VIF))

Time series and variables	Australia	New Zealand
$\ln(ASK)_{ijt}$	1.95	2.60
$\ln(Aviation\ fuel\ price)_{t}$	4.08	1.11
$\ln(GDP\ per\ capita)_{it}$	7.51	3.18
$Exchange\ rate_{ijt}$	2.16	1.28
$Samoa/Tonga\ tsunami_{jt}$	1.02	1.04
$GFC\ 2008/09_{t}$	3.78	2.20
$Cyclone\ Winston\ (Cat\ 5)_{jt}$	1.02	1.01
$Cyclone\ Gita\ (Cat\ 5)_{jt}$	1.01	1.01
LCC_share_{ijt}	2.45	2.17
$\ln(Distance)_{ijt}$	3.16	2.21

Remark: The typical recommended maximum value of VIF is 10 (Wooldridge, 2014).

To estimate the panel data regression model as specified in Equation (1), all the variables of interest need to be stationary to avoid the problem of spurious correlation (Acock, 2008; Alba & Papell, 2007; Wooldridge, 2014). Therefore, the panel data unit root was performed to check if the variables of interest were stationary. For the case of Australia, all the variables of interest were found to be stationary, except for $\ln(Aviation\ fuel\ price)_{t}$, $\ln(GDP\ per\ capita)_{it}$, $Exchange\ rate_{ijt}$ and LCC_share_{ijt}. For the case of New Zealand, all the variables of interest were found to be stationary, except for $\ln(Aviation\ fuel\ price)_{t}$ and $\ln(GDP\ per\ capita)_{it}$. First-order differencing was applied to convert the non-stationary variables to be stationary (see Table 5).

Table 5 Panel unit root test results (January 2008-December 2018)

Explanatory variables	Australia		New Zealand		Australia (first-order differencing)		New Zealand (first-order differencing)	
	ADF	PP	ADF	PP	ADF	PP	AFD	PP
$\ln(Inbound\ tourists)_{ijt}$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***

$\ln(ASK)_{ijt}$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
$\ln(Aviation\ fuel\ price)_{t}$	0.780	0.780	0.780	0.780	0.000***	0.000***	0.000***	0.000***
$\ln(GDP\ per\ capita)_{it}$	0.999	0.999	0.993	0.993	0.000***	0.000***	0.000***	0.000***
$Exchange\ rate_{ijt}$	0.268	0.268	0.268	0.268	0.000***	0.000***	0.000***	0.000***
$Samoa/Tonga\ tsunami_{jt}$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
$GFC\ 2008/09_{t}$	0.133	0.102	0.103	0.103	0.000***	0.000***	0.000***	0.000***
$Cyclone\ Winston\ (Cat\ 5)_{jt}$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
$Cyclone\ Gita\ (Cat\ 5)_{jt}$	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
LCC_share_{ijt}	0.139	0.139	0.007***	0.007***	0.000***	0.000***	0.000***	0.000***
$\ln(Distance)_{ijt}$	0.934	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Remarks: The values indicate *p*-values. The test is shown for the constant only. ** and *** indicate the rejection of the null hypothesis (H_0) that the time series variable has a panel unit root at 5% and 1% significance level. Ho: All panels contain unit roots. Ha: At least one panel is stationary. ADF denotes Augmented Dickey-Fuller unit root test. PP denotes Phillips-Peron unit root test. Panel unit root test is not applicable to the time-invariant variable of $\ln(Distance)_{ijt}$ (Woodridge, 2014).

- ***Endogeneity test of the selected variable***

An endogeneity test was also carried out to ensure that there is no underlying causal relationship between any two variables in this study, as recommended by previous studies in the air transport and tourism literature (Santos & Vieira, 2012; Ullah, Akhtar & Zaefarian, 2018; Tsui, 2017). There are various techniques that have been used in prior tourism and aviation studies such as fixed effects and random effects models (Rey, Myro & Galera, 2011; Naude & Saayman, 2005; Zuidberg, 2014), the generalised method of moments (GMM) model (Schultz, Tan, & Walsh, 2010) and the time series modelling such as the Box-Jenkins SARIMA approach (Lim & McAleer, 2001; Tsui et al., 2014). Two key considerations prompted this study to use the panel 2SLS model: (i) this study is based on the panel data of the four SPR countries; panel data offers a more robust statistical identification and allows interferences from complex relations (Albayrak, Ozcan, & Dobruszkes, 2020; Hakim & Merkert, 2016; Hsiao, 2014). Song and Li (2008) also argued that there is a need for more panel data approach research on tourism studies; and (ii) this study needs to address the endogeneity problem of the key variable of interest, $\ln(ASK)$ during estimation. In this study, the possible endogeneity between ASKs (scheduled airline seat capacity) and the number of inbound tourists to the SPR countries may lead to inconsistent estimators or biased estimation results (Kohler & Kreuter, 2005; Pevalin & Robson; 2009; Prideaux, 2000). The 2SLS approach with an appropriate instrumental variable (IV) can address this endogeneity problem (Hsiao, 2014; Tsui, Tan & Shi, 2016; Wooldridge, 2014). The HHI is used as the IV for $\ln(ASK)$ in this study, which measures airline market competition in the SPR countries (the calculation of HHI is based on the market shares of each airline's total scheduled ASK serving each of the destinations) (Tsui, 2017; Tsui, Tan & Shi, 2016). The Sargant test result (*p*-value = 0.000) validates the use of $\ln(HHI)_{ijt}$ as a robust IV for $\ln(ASK)_{ijt}$.[1] The result showed that $\ln(HHI)_{ijt}$ was uncorrelated with the error term in the regression models for the case of Australia and New Zealand, so this IV should produce an unbiased coefficient estimate with which the causality between $\ln(Inbound\ tourists)_{ijt}$ and $\ln(ASK)_{ijt}$ can be inferred (Tsui, Tan & Shi, 2016).

In addition to the 2SLS model specified in Equation (1), this study attempted to identify any serial correlation between the current and previous periods of tourist arrivals ($\ln(Inbound\ tourists)_{ijt}$) to the sampled SPR countries by including a one-period lagged value on $\ln(Inbound\ tourists)_{ijt-1}$, as specified in Equation (2). In the tourism literature, a travel demand model often includes the lagged dependent variable (Balli, Balli & Louis, 2016; Garin-Munoz, 2009; Zhang, 2015). Furthermore,

[1] For the sake of brevity, the Sargant test results are not reported. Please contact corresponding author for the results.

Mervan and Payne (2007), Leitao (2009) and Zhang (2015) argued that the lagged dependent variable should be interpreted as habit formation because knowledge about the destinations from their previous holiday experiences or their friends' visits would reduce any uncertainty associated with the destination country, which may lead to an increase in returning and new visitors. It should be also noted that the effect of ignoring post-travel trends will result in overstating the impact of other variables. Therefore, a dynamic panel 2SLS model is established in Equation (2):

$$\begin{aligned}\ln(Inbound\ tourists)_{ijt} &= \beta_0 + \beta_1 \ln(Inbound\ tourists)_{ijt-1} + \beta_2 \ln(ASK)_{ijt} + \\ &\beta_3 \ln(Aviation\ fuel\ price)_t + \beta_4 \ln(GDP\ per\ capita)_{it} + \beta_5 (Exchange\ rate)_{ijt} + \\ &\beta_6 (Samoa/Tonga\ tsumani)_{jt} + \beta_7 (GFC\ 2008/09)_t + \\ &\beta_8 (Cyclone\ Winston\ (Cat\ 5))_{jt} + \beta_9 (Cyclone\ Gita\ (Cat\ 5))_{jt} + \beta_{10} (LCC\_share)_{ijt} + \\ &\beta_{11} \ln(Distance)_{ijt} + \varepsilon_{ijt} \qquad (2)\end{aligned}$$

5. Empirical results

The 2SLS models in Section 4 were applied to two panel datasets of inbound tourists from Australia and New Zealand to the four selected SPR countries (the Cook Islands, Fiji, Samoa and Tonga). The empirical results are summarised and discussed below.

5.1 Empirical results of panel 2SLS model

Table 5 shows the estimation results of the 2SLS model for Australia and New Zealand, respectively. The explanatory variables include a set of aviation factors and economic factors that may influence tourism demand or growth within the SPR countries from Australia and New Zealand. The estimated models indicated a robust explanatory power with high R^2 values of 91.9% and 79.2% for Australia and New Zealand, respectively. The primary variable of interest investigated in this study is $\ln(ASK)_{ijt}$ or seat capacity of scheduled airlines serving the sampled SPR countries. The estimation results confirmed a strong relationship between growth in scheduled airline services and tourism demand growth within the sampled SPR countries. The findings indicated that a 1% increase in $\ln(ASK)_{ijt}$ or scheduled seat capacity from Australia is associated with a 1.03% increase in monthly tourists to the four selected SPR countries. In the case of New Zealand, a 1% increase in $\ln(ASK)_{ijt}$ is associated with a 0.81% increase in the monthly tourist arrivals from New Zealand to the four SPR countries. These empirical findings suggested that the key variable of $\ln(ASK)_{ijt}$ for the cases of Australia and New Zealand played an essential role in transporting international visitors to visit the SPR countries and contributed to their tourism growth. The estimation results also implied that an increase in airline capacity positively increased the number of inbound tourists travelling to the sampled SPR countries from Australia and New Zealand.

Table 6. Estimation results for inbound tourists from Australia and New Zealand

Dependent variable = ln(*Inbound tourists*)$_{ijt}$

Explanatory variables	Australia		New Zealand	
	Coefficients	Standard error	Coefficients	Standard error
$\ln(ASK)_{ijt}$	1.033***	0.017	0.812***	0.029
$\ln(Aviation\ fuel\ price)_t$	-0.555***	0.221	-0.416**	0.171
$\ln(GDP\ per\ capita)_{it}$	1.714	1.624	-0.339	0.816
$Exchange\ rate_{ijt}$	0.331	1.002	-0.471***	0.094
$Samoa/Tonga\ tsunami_{jt}$	-0.935	0.228	0.094	0.240
$GFC\ 2008/09_t$	0.045	0.054	0.015	0.054
$Cyclone\ Winston\ (Cat\ 5)_{jt}$	-0.183	0.391	-0.355	0.333
$Cyclone\ Gita\ (Cat\ 5)_{jt}$	-1.24***	0.390	-0.919***	0.333
LCC_share_{ijt}	-0.002	0.003	0.002	0.002
$\ln(Distance)_{ijt}$	2.060***	0.164	-0.329**	0.137
R^2	0.919		0.792	
F-statistics	515		162.02	
Observations	479		524	

Remark: *, ** and *** indicate that the variable is significant at the 10%, 5% and 1% significance levels, respectively.

Conceptually, an increase in airfares would negatively impact tourism demand. Consistent with previous studies (Morley, 2003; Oum, Fu & Yu, 2005; Tsui, 2017), the variable of $\ln(Aviation\ fuel\ price)_t$ as the proxy for airfares in this study and was found to negatively and significantly affect tourism demand for the SPR countries from both Australia and New Zealand. The findings indicated that a 1% increase in aviation fuel price reduced the number of tourists travelling from Australia by 0.56% and New Zealand by 0.42% to the selected SPR countries, respectively. Importantly, these empirical findings supported previous studies (Cheers et al., 2018; Taumoepeau, 2010), aviation fuel as a proxy of transport costs and airfares.

The estimation results also indicated that the coefficient estimates of $\ln(GDP\ per\ capita)_{it}$ (the income level variable of Australia or New Zealand) were not statistically significant. These findings are contrary to some previous tourism and aviation studies (Crouch, 1994; Leitao; 2009; Zhang, 2015), even for less-developed countries (Naude & Saayman, 2005). The estimation results may be explained by the tourists' motivation and purposes for travelling to the sample SPR countries. This may include purposes such as attending annual religious conferences, family reunions, functions or local celebrations that may not be influenced by the tourists' income factor. Although this study followed the established definition of tourists used by the United Nations World Tourism Organisation, some travellers in our sample may be linked to religious and business purposes, which tend to be less sensitive to their income levels. Another possibility is that there is a group of travellers who regard the SPR destinations as special or 'must-have' visits and thus care less about their income level.

There were interesting findings observed in relation to the estimation results for the $Exchange\ rates_{ijt}$ variable between the countries of origin (Australia and New Zealand) and the destination countries (the Cook Islands, Fiji, Samoa and Tonga). The estimation results indicated that the fluctuation of $Exchange\ rates_{ijt}$ variable significantly impacted tourists from New Zealand to the sampled SPR nations, but not Australian tourists. The results indicated that a 1% increase in exchange rate would reduce the number of inbound tourists from New Zealand to the Cook Islands, Fiji, Samoa and Tonga by 0.47%. This result supports previous studies which suggested that tourists are sensitive to tourism price in terms of accommodation, food and wine (e.g., Dobruszkes, Lennert & Hamme, 2011; Santana-Galleo, Ledesma-Rodriguez & Perez-Rodriguez,

2010; Tsui et al., 2019). On the other hand, Australian tourists were not significantly impacted by the fluctuation of exchange rate between Australia and the Cook Islands, Fiji, Samoa and Tonga, or tourism price offered in those four SPR countries. This result is consistent with Kotler, Bowen and Makens (2006) and that majority of inbound tourists to Samoa and Tonga are categorised as tourists visiting friends and relative, who are likely to stay in private homes with family and friends, and are insensitive to tourism prices. Similarly, Seetaram (2012) found that Australian tourists do not appear to be sensitive to tourism prices to visit overseas destinations.

The four exogenous factors (i.e., $Samoa/Tonga\ tsunami_{jt}$, $GFC\ 2008/09_{jt}$, $Cyclone\ Winston\ (Cat\ 5)_{jt}$ and $Cyclone\ Gita\ (Cat\ 5)_{jt}$) were included in the models to account for any significant unforeseeable events from 2008 to 2018 that might adversely impact tourism demand for the SPR countries. The significant negative impact on tourism demand for the sampled SPR countries from Australia and New Zealand was only found for the exogenous shock of $Cyclone\ Gita\ (Cat\ 5)_{jt}$. It is evident that $Cyclone\ Gita\ (Cat\ 5)_{jt}$ destroyed a significant amount of infrastructure, including Fua'amotu International Airport, the main gateway airport to Tonga, and hotels and restaurants, which adversely affected tourist numbers to the SPR countries. This is in line with Kissling (2014), who found that natural disasters had negative impacts on tourism demand to the SPR. The SPR is prone to natural disasters because of its geographical location (Taumoepeau, 2010).

The estimation results indicated that the coefficient estimate of the LCC_share_{ijt} variable were not statistically significant for Australia and New Zealand cases. These empirical results are conflicted with previous claims that LCCs was one of the main factors that contributed to the growth in the tourism industry in the SPR (Taumoepeau & Kissling, 2013; Taumoepeau, Towner & Losekoot, 2017). The estimation results are likely to be a reflection of LCCs' low share of total ASKs between Australia and New Zealand and the SPR during the study period. For instance, LCCs only accounted for 15.6% of total ASKs from Australia and 4.9% from New Zealand to the selected SPR countries during the study period. In other words, the tourism markets between Australia and New Zealand and the SPR was dominated by full-service carriers (FSCs). For Australia, Fiji Airways, Qantas and Virgin Australia, dominated the Australian market into the Cook Islands, Fiji, Samoa and Tonga, with 30.9%, 30.7% and 31.1% of total ASKs, respectively. Additionally, this study recognised that although Virgin Australia first entered the SPR as an LCC, but it evolved into a FSC in 2011. For New Zealand, Air New Zealand Ltd and Virgin Australia dominated the markets of New Zealand and the Cook Islands, Fiji, Samoa and Tonga, with 22% of total ASKs and 14.4% of total ASKs, respectively.

The distance variable is one of the critical factors for understanding the nature of tourism demand and growth within the SPR. The $\ln(Distance)_{ijt}$ variable measures the flying distance of the sampled SPR countries from Australia and New Zealand. The estimation results for $\ln(Distance)_{ijt}$ for both countries are quite interesting. For Australia, the significant positive coefficient estimate of $\ln(Distance)_{ijt}$ suggests a 1% increase in flying distance increased tourist numbers by 2.06% from Australia to the SPR countries. This estimation result suggested that this distance impediment did not deter inbound travellers from Australia to the SPR. In air transport studies, it is generally found that travel demands tend to decrease with distance because travel costs and time tend to increase with distance. For New Zealand, the $\ln(Distance)_{ijt}$ variable between the SPR countries and New Zealand reported with a statistically significant and negative coefficient estimate, which

shows its negative impact on tourism demand for the sampled SPR countries. A 1% increase in flying distance reduced tourism demand by 0.33% from New Zealand to the SPR countries. This result supported previous studies (Ach & Pearce, 2009; Koo, Lau & Dwyer, 2017; Koo, Wu & Dwyer, 2012), which highlighted the distance factor as having a negative impact on tourism demand. Importantly, the distance variable from New Zealand followed the distance decay theory, which emphasises that the longer the distance for tourists to travel, the less likely for tourists to travel this distance (McKercher, Chan & Lam, 2008; McKercher & Lew, 2003).

5.2 Empirical results of dynamic panel 2SLS model

Considering the likely effect of repeated tourist visits to the sampled SPR countries in this study, Table 6 shows the estimation results of the variable of ln(*Inbound tourists*)$_{it-1}$ (the lagged value of inbound tourists from Australia and New Zealand) and the same set of other explanatory variables included in the models. The models have good explanatory power as shown by the fairly high R^2 values. This new variable of ln(*Inbound tourists*)$_{it-1}$ aims to capture the dynamic information on tourist numbers to the sampled SPR countries (Balli, Balli & Louis, 2016; Zhang, 2015), which was confirmed to be an important factor for tourism growth in the SPR countries, with a statistically significant and positive coefficient estimate for Australia and New Zealand, respectively. Overall, the estimation results of Table 6 obtained with the dynamic panel 2SLS model produced similar results to Model 1, as reported in Table 5. A notable difference is that ln(*Distance*)$_{ijt}$ became insignificant for the case of New Zealand, but still with the negative coefficient sign. Because the dynamic model controls for repeated travel behaviour, its explanatory power is likely to be better, as expected.

Table 7. Dynamic panel 2SLS model with the lagged dependent variable

Dependent variable = ln(*Inbound tourists*)$_{ijt}$				
Explanatory variables	**Australia**		**New Zealand**	
	Coefficients	**Standard error**	**Coefficients**	**Standard error**
ln(*Inbound tourists*)$_{ijt-1}$	0.189**	0.084	0.571***	0.040
ln(*ASK*)$_{ijt}$	0.839***	0.091	0.349***	0.045
ln(*Aviation fuel price*)$_{t}$	-0.522***	0.200	-0.254	0.150
ln(*GDP per capita*)$_{it}$	1.647	1.461	-0.795	0.716
***Exchange rate*$_{ijt}$**	0.299	0.902	-0.221***	0.085
***Samoa/Tonga tsunami*$_{jt}$**	-0.111	0.205	-0.032	0.210
***GFC 2008/09*$_{t}$**	0.044	0.049	-0.012	0.048
***Cyclone Winston (Cat 5)*$_{jt}$**	-0.264	0.353	-0.365	0.292
***Cyclone Gita (Cat 5)*$_{jt}$**	-1.182***	0.352	-0.806***	0.292
***LCC_share*$_{ijt}$**	-0.005	0.002	0.002	0.002
ln(*Distance*)$_{ijt}$	1.681***	0.239	-0.148	0.123
***R*^{2}**	0.934		0.840	
***F*-statistics**	606.61		236.28	
Observations	479		524	

Remark: *, ** and *** indicate that the variable is significant at the 10%, 5% and 1% significance levels, respectively.

5.3 Robustness check

We further tested the models' robustness by aggregating the panel data of tourist arrivals from Australia and New Zealand into a one-panel dataset in two scenarios. The 2SLS estimation results are reported in Table 7 and are mostly consistent with those of Tables 5 and 6. Overall, although we observed some country-specific patterns for tourist arrivals from Australia and New Zealand together, the estimated patterns of are generally consistent for both scenarios.

Table 8. Estimation results for Australia and New Zealand (aggregated dataset)

Dependent variable = ln(*Inbound tourists*)$_{ijt}$				
Explanatory variables	**Australia & New Zealand**		**Australia & New Zealand (lagged dependent variable)**	
	Coefficients	**Standard error**	**Coefficients**	**Standard error**
ln(*Inbound tourists*)$_{ijt-1}$	-	-	0.685***	0.033
ln(*ASK*)$_{ijt}$	0.797***	0.012	0.252***	0.032
ln(*Aviation fuel price*)$_{t}$	-0.446***	0.153	-0.298***	0.119
ln(*GDP per capita*)$_{it}$	0.139	0.875	-0.396	0.677
***Exchange rate*$_{ijt}$**	-0.201***	0.066	-0.618	0.051
***Samoa/Tonga tsunami*$_{jt}$**	0.048	0.186	-0.084	0.144
***GFC 2008/2009*$_{t}$**	0.046	0.049	0.007	0.038
***Cyclone Winston (Cat 5)*$_{jt}$**	-0.136	0.290	-0.382*	0.225
***Cyclone Gita (Cat 5)*$_{jt}$**	-1.123***	0.290	-0.914***	0.225
***LCC_share*$_{ijt}$**	-0.002**	0.001	-0.001	0.001
ln(*Distance*)$_{ijt}$	0.589***	0.056	0.182***	0.050
R^2	0.861		0.917	
***F*-statistics**	462.40		978.66	
Observations	1003		1003	

Remark: *, ** and *** indicate that the variable is significant at the 10%, 5% and 1% significance levels, respectively.

6. Discussion & policy implications

This section focuses on discussing the empirical findings of this study, with an aim to identify the policy implications and the managerial insights for policymakers and aviation and tourism stakeholders within the SPR.

Given the increasing prominence of the aviation and tourism sectors in the SPR economies (South Pacific Tourism Organisation, 2018), it is vital to empirically examine the impact of the aviation industry (particularly the airline industry) on the growth of the tourism industry. This study provides a comprehensive and thorough examination of how the aviation factors (i.e., scheidled seat capacity and the emergence of LCCs) and other vital economic factors (i.e., cost of transportation, income of the orgins and destinations, exchange rates and the exogenous factors) that might influence tourism demand for the SPR countries. The key observations and estimation results can be summarised as shown below.

6.1 Effect of the aviation industry on tourism growth within the SPR

The findings of this study suggest that the aviation industry significantly contributed to tourism growth in the SPR countries. In the models, ln(ASK)$_{ijt}$ from Australia and New Zealand had a strong positive relationship with tourism demand within the sampled SPR countries (the Cook Islands, Fiji, Samoa and Tonga). This finding implies that airline capacity (aviation growth) leads

to tourism growth (increasing tourism demand) in the SPR (i.e., small developing island countries). This study echoes prior studies that aviation growth is one of the driving forces of tourism growth in different countries and regions (Duval & Schiff, 2011; Raguraman, 1997). Similarly, the positive correlation between tourism and aviation and economic growth has been well documented (e.g., Bieger & Wittmer, 2006; Duval, 2013; Forsyth, 2006; Lohmann & Duval, 2015; Spasojevic, Lohmann & Scott, 2018). However, the case of small developing countries that are isolated and far away from other major economies, such as the SPR countries being investigated in this study, has not received any formal econometric analysis. Our investigation of the Cook Islands, Fiji, Samoa and Tonga for the period 2008–2018 thus provides a good complementary analysis.

Importantly, this study further suggests that improved aviation services will contribute to tourism growth. This implies that the SPR's governments' support for aviation services will trigger growth in their tourism sectors, which, in turn, lead to increased demand for air travel, creating a positive feedback loop. From the perspective of policymakers, such as civil aviation authorities, the South Pacific Tourism Organisation and the national tourism authorities within the SPR, the findings of this study suggest that a meaningful first step would be to increase aviation services to start the positive loop. For example, low-cost measures and policies to be implemented by the government agencies may include increasing air access via more liberalised air service agreements and capacity to the SPR. Governments within the SPR might also consider route development strategies to develop more new destinations (not just Australia and New Zealand) and emerging tourism markets such as China (South Pacific Tourism Organisation, 2018). These improvements can be embodied by reviewing their current restrictive bilateral air service agreements with foreign countries towards more liberalised or open skies agreements. Cheer et al. (2018) argued that air transport services within the SPR still rely on bilateral agreements and are more restrictive than in other parts of the world. For instance, Fiji is not a party to any multilateral agreements but instead has 28 bilateral air service agreements in place, with various restrictions on seat capacity, frequency and airfares. Improving airline capacity in the SPR would improve air connectivity, which would promote tourism and local and regional economies. Other commercial arrangements between airlines, such as code-sharing schemes, may also provide a more efficient and effective mechanism for fast aviation growth without substantial airline investments and costs. For instance, Singapore Airlines has had a code-sharing arrangement with Virgin Australia and New Zealand into the Pacific Region since 2012 (Virgin Australia, 2012). Additionally, Fiji Airways entered into a code-sharing partnership with British Airways in 2018, with an anticipated increased market from Europe and the UK (Fiji Airways, 2012). Government agencies in the SPR should facilitate or even promote such commercial arrangements.

From the airline executives' perspective, they should provide better connectivity and access for incoming tourists to reach the SPR through multiple stopovers and/or code-sharing schemes. Such schemes will facilitate the SPR expanding into a broader tourism market. For the case of Fiji, there are currently three departure points (Auckland, Christchurch and Wellington) from New Zealand and five departure points (Adelaide, Brisbane, Gold Coast, Melbourne and Sydney) from Australia. Although our study has not examined travellers' disutility towards more stopovers, we have identified evidence that tourists were not very sensitive to tourism prices. It is likely that air

travel demand to the SPR region is fairly robust, which would allow airlines to use multi-stop flights to aggregate travel demand and reduce their operating costs.

6.2 Implications for close collaboration between aviation and tourism within the SPR

The South Pacific Tourism Organisation (2013) reported that, international tourists to the SPR only accounted for 1% of total global tourists in 2012 and this has good potential to grow at an annual rate of 3.3% within the SPR. To promote the growth of the tourism industry in the SPR, the nature and characteristics of inbound tourists should be further explored. Taumoepeau, Towner and Loosekoot (2017) claimed that the SPR's tourism needs international tourists to support the development of the aviation sector, as the small population size and market size within the SPR could not sustain aviation growth alone. The results of this study suggest that aviation and tourism demand in the SPR are highly correlated and that repeat visitors also played a significant role. Therefore, governments in the SPR may consider strategic policies and interventions, such as the establishment of a regional strategic plan to attract and bring opportunities to the SRP as a whole. Such a plan should facilitate the SPR countries to combine their travel demands and tourism resources so that aviation services can be sustained and increased. This may, among other steps, involve the creation of hub-and-spoke aviation networks in the region, so that international travel can be directed to a few selected gateway airports (e.g., Nadi International Airport or Samoa International Airport), then routed through the region's own network. This would require close cooperation among the SPR countries, especially competing airports and airlines, to work together.

Countries in the SPR may also cooperate on disaster prevention programs and infrastructure investment and financing cooperative programmes. The significant impact of natural disasters represented by Cyclone Gita puts forward the need for a coordinated policy for a response from the tourism and aviation industries. The SPR is prone to natural disasters, and aviation stakeholders should ensure that there are policies in place to rectify any damage caused by natural disasters to the aviation industry and tourism demand. For example, airport mutual aid agreements and programmes have been established in the US through which member airports can leverage each other's resources during natural disasters (e.g., the Southeast Airports Disaster Operations Group) (Airport Cooperative Research Program, 2012). Such practices are codified in the regulations for airport certification in the US and are recommended by the International Civil Aviation Organisation (2012). The SPR countries may consider similar cooperative programmes for the region's aviation sector.

From the airline executives and tourism authorities' and operators' perspectives, this study also highlights the need for closer and stronger partnerships between airlines and tourism stakeholders. With a clear synergy between the two sectors, as identified in this study, tourism authorities and civil aviation authorities within the SPR should focus on establishing a joint collaboration taskforce to develop joint policies that would both be beneficial for both industries (Lawson, 2017). Besides, they should focus on the formation of a strong partnership to advertise and promote the SPR destinations cost-effectively to prospective international tourists via destination advertising and promotion campaigns by airlines, airports, and tourism authorities and operators.

One of the excellent cases to look at is how Singapore's tourism agency worked closely with Changi Airport in the early days to promote transfer traffic through the airport and city tourism to facilities under the management of the tourism board (Henderson, 2006).

6.3 Implications of aviation and tourism growth for economic growth opportunities within the SPR

The tourism industry significantly contributes to economic growth in the SPR, allowing the SPR countries to reduce dependency on foreign aid (Everett, Simpson & Wayne, 2018). From a policymakers' perspective, the empirical results presented in this study highlight the need for the SPR's governments to prioritise their developing projects within the aviation and tourism sectors (i.e., favourable aviation and tourism policies, airport infrastructural developments, and hotel and accommodation development projects, etc.), which are both of critical importance to the region - especially as these are important to the region's welfare and growth in other sectors such as health, education and foreign business investment (Kissling, 2014; Milne, 1992; Taumopeau, Towner & Losekoot, 2017). The study also finds that international inbound tourists are not very sensitive to income factors, suggesting that many trips are probably a "must-have" for them. Therefore, it is important for governments and aviation operators in the SPR to ensure that quality aviation services and necessary air connectivity are maintained for the region to continue to transport and attract tourists to the region (e.g., Button & Yuan, 2012; Everett, Simpson & Wayne, 2018; Hazledine & Collins, 2011; Tolkack, Chon & Xiao, 2016).

7. Conclusion

This study aimed to empirically investigate the effects of the aviation industry and key economic factors on tourism demand within the SPR. This was achieved by using a 2SLS estimation with the monthly panel datasets of inbound tourists from Australia and New Zealand to the four SPR countries (the Cook Islands, Fiji, Samoa and Tonga) for the period January 2008−December 2018. There are several key findings that can be drawn from this study. First, scheduled airline capacity positively and significantly increased tourism within the SPR countries, and the current period of tourism demand is significantly correlated with the previous period's tourism demand. It was also found that other socio-economic factors have a statistically significant and negative impact on the growth of the SPR's tourism, including aviation fuel prices, the flying distance from Australia and New Zealand to the sampled SPR countries, and the exogenous shock (i.e., Cyclone Gita).

To be the best of the authors' knowledge, this is the first empirical study based on industry data to analyse the relationship between aviation and tourism in the SPR. Importantly, the identified factors highlighted distinct features of the SPR, as it is isolated from the rest of the world with limited resources and long distances from global tourism markets, except for Australia and New Zealand.

The empirical results of this study offered evidence of a strong link between aviation and tourism growth in the SPR, calling for regional cooperation and coordinated policies between the aviation

and tourism sectors of the region, as well as the SPR's governments. In particular, the region's governments and the aviation industry should also consider cooperative programmes for disaster management and regional aviation network development to consolidate traffic demands at the route level.

Although this study has conducted one of the first quantitative empirical studies for the SPR region (a less researched area), some notable limitations are observed: (i) this study could not include all the 15 countries in the SPR because of limited data availability from other smaller island countries. In particular, there is rather limited access to data on the monthly inbound tourists to smaller SPR countries; and (ii) it was difficult to obtain airfare, revenue passenger kilometres (RPK), length of stay for tourists, and accommodation type data for all the four sampled SPR countries (and also other smaller countries in the SPR). If these variables become available and can be included in this study, the analysis would be more powerful for quantifying the effects of additional economic factors and analysing what could be done to further promote tourism growth in the SPR. Limited access to public data within the SPR is probably the key reason for the limited empirical studies for the region (Jayaraman, 2006). This study is a modest first step in the right direction but is far from perfect or conclusive.

This study highlighted several interesting areas for future research as the extension of this study. In view of the impact of travel costs, an additional robust examination of the linkages between air transport costs (airfare level or ticket prices) and tourism demand and growth could be carried out for the sampled SPR countries, if airfares and RPK data become available. It is commonly accepted that transport cost is a key element for total travel budget and expenditure. Other potential and worthwhile areas for future research may include investigations of market share dynamics and price competition between incumbent airlines and LCCs (i.e., Air New Zealand and Virgin Australia, Fiji Airways *vs*. Jet star) serving the SPR, so that better insights can be obtained into market dynamics in the SPR and how they (including LCCs) affect the region's tourism growth and development. Another important area may also include the examination of the factors affecting the global tourism market's connectivity to the SPR, which would help the SPR governments to devise air transport policies to expand its markets beyond the traditional tourism source countries (Australia, New Zealand and the US) to other emerging tourism markets such as China and Asian countries. Lastly, due to the adverse impacts of COVID-19 global pandemic on aviation, tourism and economic development, future studies relating to the SPR's aviation sectors may review the current air transport subsidies offered in the SPR (if any) and examine whether international air transport subsidy frameworks can be applied by the SPR governments to support their economic growth, notably in the aviation and tourism sectors. For example, international models such as Public Service Obligations in European countries showed evidence that air transport subsidies could improve air connectivity and access to landlocked developing countries and smaller island countries (International Civil Aviation Organisation, 2005), which facilitated their economic and tourism growth. However, limited empirical studies of the impact of air transport subsidies have been carried out so far in the SPR, despite the great efforts of academic community and international organisations.

References

Ach, S., & Pearce, B. (2009). How well does the travel & tourism competitiveness index explain differences in travel intensity among countries?. In J. Blanke & T. Chiesa, (Eds.), *The Travel & Tourism Competitive Report 2009*. (pp 55–64). Geneva: World Economic Forum.

Acock, A. C. (2008). *A Gentle Introduction to Stata* (2nd ed.). College Station: Stata Press.

Airport Cooperative Research Program.United States. (2012). *Airport-to-Airport Mutual Aid Programs* (Vol. 73). Washington D.C.:Transportation Research Board, Federal Aviation Administration, IEM, Inc, Smith-Wollwine Associates Inc., & Transolution LLC.

Alba, J. D., & Papell, D. H. (2007). Purchasing power parity and country characteristics: evidence from panel data tests. *Journal of Development*, *83*(1), 240–251.

Albayrak, N. B. K., Ozcan, I. C., & Dobruszkes, F. (2020). The determinants of air passenger traffic at Turkish airports. *Journal of Air Transport Management*, *86*, 101818.

Alegre, J., & Sard, M. (2015) When demand drops and prices rise. Tourists packages in Balearic Islands during the economic crisis. *Tourism Management*, *46*, 375–385

Allen, D., & Yap, G. (2009). *Modelling Australian Domestic Tourism Demand: A Panel Data Approach*. Paper presented at the meeting of 18th World IMACS/MODSIM, Cairns, Australia. Retrieved from http://mssanz.org.au/modsim09 (accessed 28 February 2020).

Alguilo, E., Rey, B., Rossello, J. M., & Torres, C. (2007). The impact of post-liberalisation growth of LCCs on the tourism trends in Spain. *Rivista di Politica Economica*, *97*(1/2), 39–60.

Alsumairi, M., & Tsui, K. W. H. (2017). A case study: The impact of low-cost carriers on inbound tourism of Saudi Arabia. *Journal of Air Transport Management*, *62*, 129–145.

Alvarez-Diaz, M., Gonzalez-Gomez, M. & Otero-Giraledez, M. (2019). Low-cost airlines and international tourism demand in the northwest of the Iberian Peninsula. J*ournal of Air Transport Management*, *79*, 101689.

Balli, F., Balli, H. O., & Louis, R. J. (2016). The impacts of immigrants and institutions on bilateral tourism flows. *Tourism Management*, *52*, 221–229.

Baltaci, N, Sekmen, O., & Akbulut, G. (2015). The relationship between air transport and economic growth in Turkey: cross-regional panel data analysis approach. *Journal of Economics and Behavioural Studies, 7*(1), 89–100.

Baltagi, B. H. (2001). *Econometrics Analysis of Panel Data* (2nd ed.). Chichester: John Wiley & Sons Ltd.

Bamberger, G. E., Carlton, D. W., & Neumann, L. R. (2004). An empirical investigation of the competitive effects of domestic airline alliances. *Journal of Law and Economics*, *44*(1), 195–222.

Barros, C., & Wanke, P. (2015). An analysis of African airlines efficiency with two-stage TOPSIS and neural networks. *Journal of Air Transport Management*, *44*(45), 90–102.

Bieger, T., & Wittmer, A. (2006). Air transport and tourism. Perspectives and challenges for destinations, airlines and governments. *Journal of Air Transport Management*, *12*(1), 40–46.

Boonekamp, T., Zuideberg, J., & Burghouwt, G. (2018). Determinants of air travel demand: The role of low-cost carriers ethnic links and aviation-dependent employment. *Transportation Research Part A: Policy and Practice*, *11*, 18–28.

Borenstein, S., & Rose, N. L. (2014). How airline markets work…or do they? Regulatory reform in the airline industry. In N. Rose (Ed.), *Economic Regulation and Its Reform: What Have We Learned?* (pp. 63–135). Chicago: University of Chicago Press.

Bråthen, S., & Halpern, N. (2012). Air transport service provision and management strategies to improve the economic benefits for remote regions. *Research in Transportation Business & Management*, *4*, 3–12.

Button, K., & Yuan, J. (2012). Airfreight transport and economic development: an examination of causality. *Urban Studies*, *50*(2), 329–340.

Cheer, J., Pratt, S., Tolkach, D., Bailey, A., Taumoepeau, S., & Movono, A. (2018). Tourism in Pacific island countries: a status quo round-up. *Asia & the Pacific Policy Studies*, *5*(3), 442–461.

Chung. J. Y. & Whang, T. (2011). The impact of low-cost carriers in Korean island tourism. *Journal of Transport Geography*, *19*(6), 1335–1340.

Civil Aviation Authority United Kingdom, (2006). *CAP 770, No-frills carriers: revolution or evolution?* A study by the Civil Aviation Authority. Retrieved from https://publicapps.caa.co.uk/docs/33/CAP770.pdf.

Clave, S. A., Saladie, O., Cortes-Jimenez, I., & Young, A. F., & Young, F. (2015). How different are tourists who decide to travel to mature destinations because of the existence of a low-cost carrier route?. *Journal of Air Transport Management*, *42*, 213–218.

Craig-Smith, S. (1996). Economic impact of tourism in the Pacific. In C. M. Hall & S. Page (Eds.), *Tourism in the Pacific: Issues and Cases*. London: International Thomson Publishing Company.

Crouch, G. (1994). The study of international tourism demand: A review of findings. *Journal of Travel Research*, *33*(1), 12–23.

Dimitriou, D. J., Mourmouris, J. C., & Sartzetaki, M. (2017). Quantification of the air transport industry socio-economic impact on regions heavily depended on tourism. *Transportation Research Procedia*, *25*, 5242–5254.

Dobruszkes, F., Lennert, M., & Hamme, G. V. (2011). An analysis of the determinants of air traffic volume for European metropolitan areas. *Journal of Air Transport Geography*, *19*, 755–762.

Dobruszkes, F., & Graham, A. (2016). Air transport liberalisation and airline network dynamics: investigating the complex relationships. *Journal of Air Transport Geography*, *50*, 1–3.

Dobruszkes, F., Mondou, V., & Ghedira, A. (2016). Assessing the impacts of aviation liberalisation on tourism: some methodological considerations derived from the Moroccan and Tunisian cases. *Journal of Transport Geography*, *50*, 115–127.

Doganis, R. (2002). *Flying Off Course – The Economics of International Airline*. New York: Routledge.

Donzelli, M. (2010). The effects of low-cost air transportation of local economy: evidence from Southern Italy. *Journal of Transport Management*, *16(3)*, 121–126.

Douglas, N., & Douglas, N. (1996). *Tourism in the Pacific: Historical Factors*. Boston: International Thomson Business Press.

Duval, D. T. (2013). Critical issues in air transport and tourism. *Tourism Geographies*, *15*(3), 494–510.

Duval, D. T., & Schiff, A. (2011). Effect of air services availability on international visitors to New Zealand. *Journal of Air Transport Management*, *17*, 175–180.

Duval, D. T., & Winchester, N. (2011). Cost-sharing in air-service provision. *Journal of Air Law and Commerce*, *76*(1), 77–96.

Efthymiou, M. & & Papatheodorou, A. (2015). Intermodal passenger transport and destination competitiveness in Greece. *Anatolia*, *26*(3), 459–471.

Everett, H., Simpson, D., & Wayne, S. (2018). *Tourism as a Driver of growth in the Pacific. A Pathway to Growth and Prosperity for Pacific Island Countries.* Manila: Asian Development Bank.

Fageda, X., Suárez-Alemán, A., Serebrisky, T., & Fioravanti, R. (2018). Air connectivity in remote regions: a comprehensive review of existing transport policies worldwide. *Journal of Air Transport Management*, *66*, 65–75.

Fiji Airways. (2012). *British Airways says bula to Fiji with Fiji Airway*s. Retrieved from https://www.fijiairways.com/en-nz/about-fiji-airways/2018-media-centre/british-airways-says-bula/ (accessed 28 February 2020).

Flouris, T., & Walker, T. J. (2005). The financial performance of low-cost and full-service airlines in times of crisis. *Canadian Journal of Administrative Sciences*, *22*(1), 3–20.

Forsyth, P. (2003). Regulation under stress: developments in Australian airport policy. *Journal Air Transport Management*, *9*(1), 25–35.

Forsyth, P. (2006). Martin Kunz memorial lecture: tourism benefits and aviation policy. *Journal of Air Transport Management*, *12*, 3–13.

Forsyth, P. (2008). Tourism and aviation policy: exploring the links. In: A. Graham (Ed.). *Aviation and Tourism. Implication for Leisure Travel* (pp. 73–82). Aldershot: Ashgate.

Forsyth, P., & King, J. (1996). *Cooperation, Competition, and Financial Performance in South Pacific Aviation.* In: G. Hufbaner and C.Findlay (Eds.)*, Flying High Liberation Aviation in the Asia Pacific,* (pp. 99–176). Washington D.C.: Washington Institute for International Economics.

Franke, M., & John, F. (2011). What comes next after the recession? Airline industry scenarios and potential end games. *Journal of Air Transport Management*, *17*(1), 19–26.

Fraser, P., & McAlevey, L. (2015) New Zealand regional house prices and macroeconomic shocks. *Journal of Property Research*, *32*(4), 279–300.

Fu, X., Dresner, M., & Oum, T. H. (2011). Effects of transport service differentiation in the U.S. domestic airline market. *Transportation Research Part E: Logistics and Transportation Review*, *47*(3), 297–305.

Fu, X., Lei, Z., Wang, K. & Yan, J. (2015a) Low cost carrier competition and route entry in an emerging but regulated aviation market – the Case of China. *Transportation Research – Part A*, *79*, 3–16.

Fu, X., Oum T. H., Chen, R., & Lei, Z. (2015b) Dominant carrier performance and international liberalization – the case of North East Asia. *Transport Policy*, *43*, 61–75.

Fu X., Oum T. H., & Zhang, A. (2010). Air transport liberalization and its impacts on airline competition and air passenger traffic. *Transportation Journal*, *49*(4), 24–41.

Garnin-Munoz, T. (2009). Tourism in Galicia. Domestic and foreign demand. *Tourism Economics*, *15*(4), 753–769.

Gillen, D., & Hazledine, T. (2015). The economics and geography of regional airline services in six countries. *Journal of Transport Geography*, *46*, 129–136.

Graham, A., & Dennis, N. (2010). The impact of low-cost airlines operations to Malta. *Journal of Air Transport Management*, *16*(3), 127–136.

Guthrie, K. (2013). Aviation regionalism in the Pacific. *The Journal of Pacific History*, *48*(3), 294–308.

Hakim, M., & Merkert, R. (2019). Econometric evidence on the determinants of air transport in South Asian countries. *Transport Policy*, *83*, 120–126.

Hakim, M., & Merkert, R. (2019). The causal relationship between air transport and economic growth: empirical evidence from South Asia. *Journal of Transport Georgraphy*, *56*, 120–127.

Halpern, N. & Graham, A. (2015) Airport route development: a survey of current practice. *Tourism Management*, *46,* 213–221.

Hazledine, T., & Collins, S. (2011). Paying the pilot? The economics of subsidising international air travel to small remote island nations with a large diaspora. *Journal of Air Transport Management*, *17*, 187–194.

Henderson, J. C. (2006). Uniquely Singapore? A case study in destination branding. *Journal of Vacation Marketing*, *13*(3), 261–274.

Hofer, C., Dresner, M., & Windle, R. (2009). The impact of airline financial distress on US airfares: a contingency approach. *Transportation Research Part E: Logistics and Transportation*, *45*, 238–249.

Hsiao, C. (2014). *Analysis of Panel Data* (3rd ed.). Cambridge, UK: Cambridge University Press.

Hu, Y., Xiao, J., Deng, Y., Xiao, Y., & Wang, S. (2015). Domestic air passenger traffic and economic growth in China: evidence from heterogeneous panel models. *Journal of Air Transport Management*, *42*, 95–100.

Hunt, J., & Tryong, D. (2019). Low-fare flights across the Atlantic: Impact of low-haul trans-Atlantic flights on passenger choice of carrier. J*ournal of Air Transport Management*, *75*, 170–184.

International Civil Aviation Organisation. (2005). *A Study of Essential Service and Tourism Development Route Scheme.* Retrieved from https://www.icao.int/sustainability/EssentialServicesStudy/EssentialServicesStudy_en.pdf (accessed 28 February 2020).

International Civil Aviation Organisation. (2012). *Regional Cooperation and Training Matters*, Twenty-fourth Meeting of Directors of Civil Aviation of the Eastern Caribbean (E/CAR/DCA/24).Retrieved from https://www.icao.int/NACC/Documents/Meetings/2012/ECARDCA24/ECARDCAS24Report.pdf (accessed 28 February 2020).

International Civil Aviation Organisation. (2019). 2019 Aviation benefits report. Retrieved from https://www.icao.int/sustainability/Documents/AVIATION-BENEFITS-2019-web.pdf (accessed 28 February 2020).

Jayaraman, T. K. (2006). Patterns of shocks and regional currency for the Pacific Islands. *Journal of Economic Integration*, *21*(1), 99–199.

Khandaker, S., & Islam, S.Z. (2017). International tourism demand and marcroeconomic factors. *International Journal of Economics and Financial Issues*, *7*(5), 389–393.

Khan, N. T., Kim, Y. H., & Kim, Y. B. (2018). The dynmatic impact of low-cost carriers on full-service carriers and the tourism industry of South Korea: a comparative analysis using the Lotka-Volterra model. *Asia Pacific Journal of Tourism Research*, *23*(7), 656–666.

Khan, N. T., Jung, G., Kim, J., & Kim, Y. B. (2018). Evolving competition between low-cost carriers and full-service carriers: the case of South Korea. *Journal of Transport Geography*, *74*, 1–9.

Lim, C., & McAleer, M. (2001). Forecasting tourists' arrivals. *Annals of Tourism Research*, *28*(4) 965–977.

Kissling, C. (2014). Networks enabling air transport services in the South Pacific: 40 years of change. In D. T. Duval (Ed.), *Air Transport in the Asia Pacific*. Burlington: Ashgate Publishing Ltd.

Kohler, U., & Kreuter, F. (2005). *Data Analysis Using Stata.* College Station, USA: Stata Press.

Koo, T. T. R., Lau, P. L., & Dwyer, L. (2017). The geographic dispersal of visitors: Insights from the power law. *Journal of Travel Research*, *56*(1), 108–121.

Koo, T., Rashidi, T., Park, J., Wu, C., & Tseng, W. (2017). The effect of enhanced international air access on the demand for peripheral tourism destinations: evidence from air itinerary choice behaviour of Korean visitors to Australia. *Transportation Research Part A: Policy and Practice*, *106*, 116–129.

Koo, T. T. R., Wu, C. L., & Dwyer, L. (2012). Ground travel mode choices of air arrivals at regional destinations: the significance of tourism attributes and destination contexts. *Research in Transportation Economics*, *26*(1), 44–53.

Kotler, P., Bowen, J., & Makens, J. (2006). *Marketing for Hospitality and Tourism* (4th ed.). Hoboken: Pearson Education.

Landre, M., & Peeters, P. (2011). Editorial: Transport and tourism: a weak symbiosis. An introduction to the special issue. *European Journal of Transport and Infrastructure Research*, *11*(3), 276–280.

Law, C. (2017). Subsidy and fair competition. *Aeronautics and Aerospace Open Access Journal*, *1*(2), 48–51.

Lawson, S. (2017). Australia, New Zealand and the Pacific Islands Forum: a critical review. *Commonweatlh & Comparative Politics*, *55*(2), 214–235.

Leitao, N. C. (2009). Modelling Portuguese tourism demand: a panel data approach. *International Journal of Engineering and Industrial Management*, *1*, 47–58

Lim, C. (1999). An econometric classification and review of international tourism demand. *Journal of Travel Research*, *37*, 273–284.

Lim, C., & McAleer, M. (2001). Forecasting tourists' arrivals. *Annals of Tourism Research, 28*(4) 965–977.

Lohmann, G., & Duval, D. T. (2015). Tourism and transport. In C. Coopter (Ed). *Contemporary Tourism Reviews Vol. 1* (pp. 129–182). Oxford: Goodfellow.

Mantin, B., & Wang, J. E. (2012). Determinants of profitability and recovery from system-wide shocks: the case of the airline industry. *Journal of Airline and Airport Management*, *2*(1), 1–21.

McKercher, B., Chan, A., & Lam, C. (2008). The impact of distance on international tourist movements. *Journal of Travel Research*, *47*(2), 208–224.

McKercher, B., & Lew, A. (2003). Distance decay and the impact of effective tourism exclusion zone on international travel flows. *Journal of Travel Research*, *42*, 159–165.
Mervan, A., & Payne, J. (2007). *An Analysis of Foreign Demand for Croatian Destinations: Long-Run Elasticity Estimates*. *Radni materijali EIZ*-a, *1*, 5–21.
Milne, S. (1992). Tourism and the development in the South Pacific microstates. *Annals of Tourism Research*, *19*, 191–212.
Mohammadian, I., Abreshi, A., Abbasi, B., & Goh, M. (2019). Airline capacity under the supply-demand equilibrium of Australia's domestic aviation market. *Transportation Research Part A: Policy and Practice*, *119*, 108–121.
Morley, C.L. (2003). Implications of international airline alliances on tourism. *Tourism Economics*, *9*(1), 31–51.
Morrell, P. (2011). Current challenges in a 'distressed industry'. *Journal of Air Transport Management*, *17*, 14–18.
Narayan, P. K. (2004). Fiji's tourism demand: the ARDL approach to cointegration. *Tourism Economics*, *10*(2), 193–206.
Narayan, P. K., Prasad, A. D., Narayan, S., & Prasad, B. C. (2010). Tourism and economic growth. A panel data analysis for Pacific Island Countries (PIC). *Tourism Economics*, *16*(1), 169–183.
Naude, A., & Saayman, A. (2005). The determinants of tourist arrivals in Africa: a panel data regression analysis. *Tourism Economics*, *11*(3), 365–391.
Njoya, E. (2016). Africa's single aviation market: the progress so far. *Journal of Air Transport Geography*, *50*, 4–11.
Oum, T., Fu, X., & Yu, C. (2005). New evidence on airline efficiency and yields: a comparative analysis of major North American air carriers and its implication. *Transport Policy*, *12*, 153–164.
Palhares, G. L. (2003). The role of transport in tourism development. Nodal functions and management practices. *International Journal of Tourism Research*, *5*, 403–407.
Pearce, D. G. (2002). Tourism and Peripherality: Perspectives from Asia and the South Pacific. *Tourism and Hospitality*, *3*(4), 296–309.
Pevalin, D., & Robson, K. (2009). *The Stata Survival Manual*. Berkshire: Open University Press.
Prideaux, B., & McNamara, K. E. (2013). Turning a global crisis into a tourism opportunity: the perspective from Tuvalu. *International Journal of Tourism Research*, *15*(6), 583–594.
Prideaux, B. (2000). The role of the transport system in destination development. *Tourism Management*, *21*(1), 53–63.
Purcell, G., & Scheyvens, R. (2015). International business mentoring for development. The importance of local context and culture. *International Journal of Training and Development*, *19*(3), 211–22.
Raguraman, K. (1997). Estimating the net economic impact of air services. *Annals of Tourism Research*, *24*(3), 638–674.
Rey, B., Myro, R. L., & Galera, A. (2011). Effect of low-cost airlines on tourism in Spain. A dynamic panel data model. *Journal of Air Transport Management*, *17*, 265–279.
Santana-Galleo, M., Ledesma-Rodriguez, F. J., & Perez-Rodriguez, J. V. (2010). Exchange rate regimes and tourism. *Tourism Economics*, *16*(1), 25–43.

Santos, C., & Vieira, J.C. (2012). An analysis of visitors' expenditures in a tourist destination: OLS, quantile regression and instrument variable estimators. *Tourism Economics, 18*(3), 555–576.

Saranga, H., & Nagpal, R. (2016). Drivers of operational efficiency and its impact on market performance in the Indian airline industry. *Journal of Air Transport Management*, *53*, 165–176.

Scheyvens, R., & Russel, M. (2009). Tourism and poverty reduction in the South Pacific. Palmerston North: Massey University.

Schiff, A. (2014). Commercial aviation data in the Asia Pacific Region. In: D.T. Duval (Ed.), *Air Transport in the Asia Pacific*. (pp.177–188). Routledge: Taylor & Francis Group.

Schiff, A., & Becken, S. (2011). Demand elasticity for New Zealand tourism. *Tourism Management*, *21*(3), 564–575.

Schultz, E. L., Tan, D. T., & Walsh, K. D. (2010). Endogeneity and corporate governance-performance relation. *Australian Journal of Management*, *35*(2), 145–163.

Seetaram, N. (2012). Estimating demand elasticities for Australia's international outbound tourism. *Tourism Economics*, *18*(5), 999–1017.

Smyth, A., Christodoulou, G., Dennis, N., Al-Azzawi, M., & Campbell, J. (2012). Is air transport a necessity for social inclusion and economic development? *Journal of Air Transport Management*, *22*, 53–59.

Song, H., & Li, G. (2008). Tourism demand modelling and forecasting – A review of recent research. *Tourism Management*, *29*(2), 203–220.

South Pacific Tourism Organisation. (2013). *2012 Annual Visitor Arrivals Report*. Retrieved from https://www.corporate.southpacificislands.travel/wp-content/uploads/2013/02/2013-AnnualTourist-Arrivals-Review-F.pdf (accessed 28 February 2020).

South Pacific Tourism Organisation. (2018). *2018 Annual Visitor Arrivals Report*. Retrieved from https://pic.or.jp/ja/wp-content/uploads/2019/07/2018-Annual-Visitor-Arrivals-ReportF.pdf (accessed 28 February 2020).

Spasojevic, B., Lohmann, G., & Scott, N. (2018). Air transport and tourism – a systematic literature review (2000–2014). *Current Issues in Tourism*, *21*(9), 975–997.

Stanley, D. (2000). *South Pacific Handbook* (7th ed.). Emeryville: Avalon Travel Publishing.

Taumoepeau, S. (2010). South Pacific. In A. Graham, A. Papatheodorou, & O. Forsyth (Eds.), *Aviation and Tourism: Implication for Leisure Travel* (pp. 323–331). Farnham: Ashgate.

Taumoepeau, S. (2014). Suitability of the low-cost airline model in the South Pacific Region. ln. D.T. Duval (Ed.), *Air Transport in the Asia Pacific*. (pp. 113–132). Routledge: Taylor & Francis Group.

Taumoepeau, S. (2016). New heights of success for Tonga's aviation and tourism. *Open Journal of International Education*, *1*(2), 67–89.

Taumoepeau, S., & Kissling, C. (2008). *Economic Sustainability of Airlines in the South Pacific*. Paper presented at the 31st Australiasian Transport Research Forum, Australia.

Taumoepeau, S., & Kissling, C. (2013). *Economic Sustainability of Airlines in the South Pacific.* Retrieved from http://crie.org.nz/research-papers/Occasional-Paper-8-South-Pacific-Airline-Semisi.pdf (accessed 25 August 2018).

Taumoepeau, S., Towner, N., & Losekoot, E. (2017). Low-cost carriers in Oceania, Pacific: challenges and opportunities. *Journal of Air Transport Management*, *65*, 40–42.

Tolkack, D., Chon, K., & Xiao, H. (2016). Asia Pacific tourism trends: is the future ours to see? *Asia Pacific Journal of Tourism Research*, *21*(10), 1071–1084.

Tsui, K. W. H. (2017). Does a low-cost carrier lead the domestic tourism demand and growth of New Zealand? *Tourism Management*, *60*, 390–403.

Tsui, W. H. K., Balli, H. O., Gilbey, A., & Gow, H. (2014). Forecasting of Hong Kong airport's passenger throughput. *Tourism Management*, *42,* 62–7.

Tsui, W. H. K., Gilbey, A., & Balli, H. (2014). Estimating airport efficiency of New Zealand airports. *Journal of Air Transport Management*, *35*, 78–86.

Tsui, W. H. K., Tan, D. T. W., & Shi, D. (2016). Impacts of airport traffic volumes on houses of New Zealand's major regions: a panel data approach. *Urban Studies*, *54*(12), 2800–2817.

Tsui, W., Tan, D., Chow, C. & Shi. S. (2019). Regional airline capacity, tourism demand and housing prices: a case study of New Zealand. *Transport Policy*, *77*, 8–22.

Ullah, S., Akhtar, P., & Zaefarian, G. (2018). Dealing with endogeneity bias: the generalized method of moments (GMM) for panel data. *Industrial Marketing Management*, *71*, 69–78.

United Nation World Tourism Organisation. (2015). *International Recommendations for Tourism Statistics 2008*. New York: United Nations Publications.

Vieira, J., Camara. G., Silva, F., & Santos, C. (2019). Airline choice and tourism growth in the Azores. *Journal of Air Transport Management*,*77*, 1–6.

Virgin Australia. (2012). V*irgin Australia Commences Codeshare on Singapore Airlines Flights*. Retrieved from https://www.virginaustralia.com/nz/en/about-us/media/2012/VIRGIN-AUSTRALIA-COMMENCES-SQ/ (accessed 28 February 2020).

Wang, K., Fu, X., Czerny, A., Hua, G., & Lei, Z. (2020a). Modeling the potential for aviation liberalization in Central Asia - Market analysis and implications for the Belt and Road initiative, *Transportation Research Part A: Policy and Practice, 134*, 184–210 .

Wang, K., Tsui, K., Li, L.B., Lei, Z. & Fu, X. (2020b). Entry pattern of low-cost carriers in New Zealand - The impact of domestic and trans-Tasman market factors. *Transport Policy*, *93*, 36–45.

Wang, K., Tsui, K. W. H., Liang, L., & & Fu, X. (2017). Entry patterns of low-cost carriers in Hong Kong and implications to the regional market. The case of the Chinese domestic market. *Journal of Air Transport Management*, *64*(B), 101–112.

Wang, M., & Song, H. (2010). Air travel demand studies: a review. *Journal of China Tourism Research*, *6*(1), 29–49. Wensveen, J. (2007). *Air Transportation* (6th ed.). Aldershot, UK: Ashgate Publishing Company.

Witt, S., & Witt, C. (1995). Forecasting tourism demand: a review of empirical research. *International of Journal Forecasting*, *11*(3), 447–475.

Wittman, M. (2014). Public funding of airport incentives in the United States: the efficacy of the Small Community Air Service Development Grant program. *Transport Policy*, *35*, 220–228.

Wittman, M. D., Allroggen, F., & Malina, R. (2016). Public service obligations for air transport in the United States and Europe: connectivity effective and value for money. *Transportation Research Part A*, *94*, 112–128.

Wooldridge, J. (2014). *Introduction to Econometrics: Europe, Middle East & Africa Edition*. Andover: Cengage Learning.

Wu, C. (2016). How aviation deregulation promotes international tourism in Northeast Asia: a case of the charter market in Japan. *Journal of Air Transport Management*, *57*, 260–271.

Young, J., & Whang, T. (2011). The impact of low-cost carriers on Korean island tourism. *Journal of Transport Geography*, *19*, 1335–1340.

Zhang, Y. (2015). International arrivals to Australia: determinants and the role of air transport policy. *Journal of Air Transport Management*, *44*, 21–24.

Zhang, Y., & Lu, Z. (2013). Low-cost carriers in China and its contribution to passenger traffic flow. *Journal China Tourism Research*, *9*(2), 207–217.

Zhang, Y., Wang, K., & Fu, X. (2017). Air transport services in regional Australia: demand pattern, frequency choice and airport entry. *Transportation Research Part A: Policy and Practice*, *103*, 472–489.

Zuidberg, J. (2014). Identifying airline cost economies. An econometric analysis of the factors affecting aircraft operating costs. *Journal of Air Transport Manamagent*, *40*, 86–95.