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ABSTRACT

We employ the asymmetric version of the Granger causality test to assess how Australian inbound and outbound tourism flows across 49 markets (countries) are driven by the sign-dependent variations in departure series or vice versa. A multivariate generalised autoregressive conditional heteroskedasticity (MGARCH) model is also estimated to study the time-varying co-volatility between inbound and outbound tourism growth rates. We find that rising co-volatility spillovers between inbound and outbound tourism are statistically significant for a number of markets. The six markets that are most susceptible to global shocks are China, Hong Kong, Papua New Guinea, Singapore, South Africa and the UK. China is by far the largest of these markets and, except for the UK, both arrivals and departures for each of these countries represent growing markets for Australia. We present recommendations for policy makers and destination management organisations (DMOs) to assist in developing customised strategies targeting resilient inbound markets in order to optimise tourism performance and reduce potential losses in times of crisis.

JEL codes: C22, Z30, Z38.

Keywords: Asymmetric causality; Tourism; Volatility; Australia.

I. Introduction

The tourism industry contributes to economic growth by providing foreign exchange income, employment opportunities, social capital, entrepreneurial activity and taxation revenue (Divisekra and Deegan, 2010; Katircioglu, 2009; Valadkhani and O'Mahony, B., 2015). However, tourism is a turbulent industry with peaks and troughs in demand influenced by a range of extraneous factors. Indeed, since the late 1990s, the industry has endured several major external shocks, resulting in substantial falls in tourism demand (Álvarez-Martínez and Polo, 2012; Feridun, 2011; Fleischer and Buccola, 2002; Raza and Jawaid, 2013; Salvanathan, 2007). The loss of revenue following such shocks, while often only temporary (see e.g. Smyth et al., 2009), has had a negative impact on many tourist destinations, challenging tourism policy makers, planners and developers to seek a greater understanding of market volatility in order to mitigate the impact of tourism shocks (Beirman 2003).

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We examine the composition of the total number of short-run arrivals to Australia (i.e. less than a year) from 49 countries and, based on the results of this analysis, consider alternative opportunities to improve tourism performance at the destination level. In Australia, the tourism industry constitutes 2.5% and 4.5% of GDP and aggregate employment, respectively, and hence plays a pivotal role in the Australian economy, creating 514,000 jobs and generating AUS$35 billion in revenue (Amelung and Nicholls, 2014). As the largest services export industry in Australia, the tourism industry generates approximately AU$24 billion in exports annually (Dwyer et al., 2014).

Our objectives in this article are twofold. The first is to identify those arrival series that show the highest degree of co-volatility with the corresponding departure series. The second is to uncover those markets that are less susceptible to unanticipated global shocks and to make recommendations for policy makers, planners and destination management organisations (DMOs) to capitalise on these markets.

We employ the asymmetric version of the Granger causality test to assess how changes in arrival series are driven by sign-dependent variations in departure series or vice versa. A multivariate GARCH model is then estimated to examine the ARCH and GARCH coefficients for each country as well as the pairwise co-volatility between the monthly growth rates of arrival and departure series. While these methods have been previously successfully employed within the finance literature to examine volatility (see e.g. Bollerslev, 1990; Chevallier, 2012; Belgacem, et al. 2015), our study extends the use of these techniques in order to assess volatility in inbound and outbound tourism flows.

We find that when inbound and outbound tourism are closely connected, volatility in arrivals tends to be lower and shocks to tourism do not have uniform effects on all markets. Based on these results we offer some recommendations for policy makers and DMOs to assist them in customising strategies targeted at resilient inbound markets in order to minimize losses in times of crisis.

The rest of this article is structured as follows. Section II provides a review of the forecasting literature, highlighting improvements in forecasting accuracy and providing further context for the study. We then present a brief discussion of our empirical methodology in Section III. Then, the descriptive statistics of the seasonally adjusted monthly data are discussed in Section IV. This is followed by the empirical results as well as the policy and destination management implications of the research. The last section offers some concluding remarks and recommendations for further research.

II. Existing literature and context for the study

Tourism forecasters recognise the importance of accurate forecasts for business planning, investment and policy formulation (Claveria et al., 2015; Petropoulos et al. 2005). Song et al. (2009) built on seminal work by Bates and Granger (1969) to test a number of forecasting combinations using tourism data, showing that combined forecasts provide more accurate outcomes and predictive capabilities than employing single models. More recently, Smeral (2014) examined demand models focussing on the asymmetric income effects across business cycles, while several studies have sought to develop models to smooth seasonal demand (see e.g. Jang, 2004).

Enhanced modelling techniques have also improved predictive power. Song et al. (2011) attempted to allow for fluctuations due to crises such as SARS, but concluded that exogenous factors continue to affect forecasting accuracy. Thus, while tourism forecasting has improved significantly, volatility still exists in most major markets, mainly because the underlying causes such as pandemics, crises, wars and natural disasters cannot be accurately predicted.

As a result, researchers recognise the need to offset fluctuations in patterns of tourism demand. For example, Song et al.'s (2011) study of demand for hotel rooms in Hong Kong, which declined significantly during the global financial crisis, found that the major negative impact of this crisis on local businesses could be mitigated by refocusing tourism promotion on Mainland China because this market was resilient and had potential for additional growth. However, they also uncovered a need to make changes at the local level, in order to accommodate the needs of tourists from the mainland. Consequently, this suggests that there is a need to address major downturns in tourism due to external shocks through employing a combination of policy shifts and management strategies that can achieve a competitive advantage and optimise performance (Dwyer et al., 2009).

There are many studies in the literature forecasting the demand for tourism in Australia (see e.g. Turner et al., 1997; Lim and McAleer, 2000, 2001; Kim, and Moosa, 2001; Dwyer et al., 2007). As a long haul destination, Australia possesses one of the most volatile tourism industries in the world. Excessive volatility in the number of inbound travellers can result in a mismatch between income and expenditure for businesses operating in this industry over time (Balli and Jean Louis, 2015). While most expenditure items, such as the costs of labour, capital, maintenance, overheads and utilities represent on going fixed costs, the revenue side can be quite unstable, exhibiting less inertia and more irregularities over time, depending on the number of travellers. Markets also rise and fall in popularity (Butler 2009). Kulendran and Dwyer (2009) found that some of Australia's major tourism markets were in a growth trajectory, others had matured and some were declining rapidly. As a result, it is important to review markets periodically to ensure that DMOs are fully prepared for changing trends. In reality, few strategies can be implemented to maintain tourism operations, employment levels and facilities in times of crisis. One option is for governments to increase taxation and for businesses to increase the price of tourism products and services. However, in a competitive environment such strategies are counterproductive (Lim and McAleer, 2001), reinforcing the need to identify markets that are resilient and have growth potential.

Australia has invested heavily in international marketing activities achieving success in several key markets, most notably China, where positive outcomes have been attributed to highly visible promotional activities since the advent of the Approved Destination Status (ADS) agreement in 1999 (Breakey et al., 2008). This was further supported by the Australian Government in 2010 when administrative reforms were put in place to streamline Chinese inbound tourism, which in turn, led to over one million visitors arriving from China in 2014 (Austrade, 2015). This type of market concentration can result in DMOs becoming overly reliant on a few major markets and thus becoming exposed to tourism crises in those markets (Shi, 2012). In the absence of accurate forecasts, there is a need to develop a better understanding of the volatility of major markets and to develop strategies that support these markets, while at the same time establishing 'back up' markets that have the capacity to improve tourism performance should major markets temporarily decline.

This diversity may include other forms of tourism, for example, business tourism, domestic tourism or tourism related to family or cultural ties such as visiting friends and relatives (VFR).Of these, business travel is predicted to decline over the next decade providing the lowest contribution to overall GDP (WTTC, 2011; Yeoman, 2008) and domestic travel does not provide export revenue. VFR tourism on the other hand, has been found to account for a growing and significant number of international trips (UNWTO, 2011). Previous studies have also found that although VFR tourism is a worldwide phenomenon, it is particularly prominent in Canada, New Zealand and Australia and is strongly linked with migration (Jackson 2003; Dwyer et al., 2010; Lockstone-Binney et al., 2013). As early as 1997, VFR tourism was valued as a form of seasonality compensation based on its capacity to generate significant tourism related and retail revenue (Seaton and Palmer 1997).

In Australia, Dwyer et al. (2010) established the link between permanent migration and tourism, and they conclude that immigration, and the policies that support it, have played a prominent role in Australia's development. Moreover, Australia's population is expected to grow from 23.9 million in 2015 to 37.6 million by 2050. This growth is predicted to result from migration rather than increases in the Australian-born population (Dwyer et al. 2010). Consequently, VFR tourism represents a viable opportunity to mitigate major fluctuations in tourism flows to Australia and to maintain market equilibrium during tourism shocks. Dwyer et al. (2010) also note that tourism flows operate in both directions with VFR coming to Australia and migrants departing Australia for their home countries. Hence, there is a need to understand inbound and outbound tourism flows. For example, a report by Tourism Research Australia (2016) for the year ending 2015, notes that while overall leisure tourism grew by 10 per cent (in 2015), VFR arrivals increased by seven per cent over the same 12 month period. In keeping with Dwyer et al's (2010) contention that migration to Australia has had a growing focus on Asia, much of this growth has come from the Asian region.

III. Empirical methodology

The relationship between the number of tourist arrivals and departures can depend on a number of factors such as existing tourist attractions, family and cultural ties, bilateral trade and investment agreements, mutual visa requirements, networks of connecting flights and the number of short-term travellers. To distinguish between the effects of positive and negative changes in one series on changes in the other series, we employ an asymmetric version of the Granger (1980) causality test which is based on the vector autoregressive (VAR) system in equations (1) and (2).

$$\Phi_k^A(L)\Delta\ln(AR_t) = \omega^A + \sum_{j=1}^{q}\theta_j^+\Delta\ln(DR_{t-j}^+) + \sum_{j=1}^{q}\theta_j^-\Delta\ln(DR_{t-j}^-) + e_t^A \tag{1}$$

$$\Phi_k^D(L)\Delta\ln(DR_t) = \omega^D + \sum_{j=1}^{q}\varphi_j^+\Delta\ln(AR_{t-j}^+) + \sum_{j=1}^{q}\varphi_j^-\Delta\ln(AR_{t-j}^-) + e_t^D \tag{2}$$

Where:

AR_t and DR_t denote the number of short-term arrivals and departures, respectively,

$\Phi_k^A(L) = (1-\rho_1 L - \rho_2 L^2 - ... - \rho_k L^k)$ is a k-order polynomial lag operator in the arrival equation (which is assumed to have all roots within the unit circle),

$\Phi_k^D(L) = (1-\rho_1 L - \rho_2 L^2 - ... - \rho_k L^k)$ is a k-order polynomial lag operator in the arrival equation (which is assumed to have all roots within the unit circle),

k is the number of autoregressive terms,

ω^A and ω^D are the corresponding intercept terms,

θ_j^+ and θ_j^- denote the short-run effects of positive and negative changes in the departure series on the arrival series at time *t-j*, respectively.

φ_j^+ and φ_j^- are the short-run effects of positive and negative changes in the arrival series on the departure series at time *t-j*, respectively.

e^A and e^D are the corresponding residual terms for the arrival and departure equations, respectively. The superscripts + and – denote the positive and negative parts of a series, respectively as defined by equations (3) and (4).

$$\Delta \ln(AR_t^+) = \Delta \ln(AR_t) \text{ if } \Delta \ln(AR_t) > 0 \text{ and } \Delta \ln(AR_t^+) = 0 \text{ if } \Delta \ln(AR_t)_t \leq 0 \tag{3}$$

$$\Delta \ln(AR_t^-) = \Delta \ln(AR_t) \text{ if } \Delta \ln(AR_t) \leq 0 \text{ and } \Delta \ln(AR_t^-) = 0 \text{ if } \Delta \ln(AR_t) > 0 \tag{4}$$

$\Delta \ln(DR_t^-)$ and $\Delta \ln(DR_t^+)$ can be defined in a similar way.

Positive and negative changes in departure series do not Granger cause any changes in arrival series if $H_0^{A+}: \theta_1^+ = \theta_2^+ = ... = \theta_k^+ = 0$ and $H_0^{A-}: \theta_1^- = \theta_2^- = ... = \theta_k^- = 0$ cannot be rejected say at the 5% level of significance. Similarly positive and negative changes in arrival series do not exert any influence on changes in arrival series if the corresponding null hypotheses, i.e. $H_0^{D+}: \varphi_1^+ = \varphi_2^+ = ... = \varphi_k^+ = 0$ and $H_0^{D-}: \varphi_1^- = \varphi_2^- = ... = \varphi_k^- = 0$, are statistically rejected, respectively. The Schwarz information criterion (SIC) is also used to determine the maximum lag length (k & q) in equations (1) and (2).

Within a multivariate GARCH framework proposed by Bollerslev (1990), we answer the following questions: (1) Based on the magnitudes of the estimated ARCH and GARCH coefficients, which markets exhibit a higher degree of time-varying volatility? (2) For which markets are the co-volatility between the monthly changes in arrival and departure series more influential? To formally answer these questions, we need to estimate three components of the MGARCH model; namely, mean, variance and covariance equations. Let us begin by specifying the following mean equation:

$$\begin{bmatrix} y_{At} \\ y_{Dt} \end{bmatrix} = \begin{bmatrix} \gamma_A \\ \gamma_D \end{bmatrix} + \begin{bmatrix} \varepsilon_{At} \\ \varepsilon_{Dt} \end{bmatrix} \tag{5}$$

Where $y_{At} = \Delta\ln(AR_t)$, $y_{Dt} = \Delta\ln(DR_t)$, ε_{At} and ε_{At} are the corresponding residual terms for the monthly growth rate of arrival and departure series, respectively. Given that both y_{At} and y_{Dt} are stationary, equation (5) presents a mean-reverting process, in which $\boldsymbol{\gamma}$ is the column vector of the average monthly growth rate of arrival and departure series. The time residual term $\boldsymbol{\varepsilon_t}$ is determined assuming a constant conditional correlation (CCC) matrix:

$$\begin{bmatrix} h_{At} \\ h_{Dt} \end{bmatrix} = \begin{bmatrix} \alpha_{A0} \\ \alpha_{D0} \end{bmatrix} + \begin{bmatrix} \alpha_{A1} & 0 \\ 0 & \alpha_{D2} \end{bmatrix} \begin{bmatrix} \varepsilon^2_{At-1} \\ \varepsilon^2_{Dt-1} \end{bmatrix} + \begin{bmatrix} \beta_{A1} & 0 \\ 0 & \beta_{D2} \end{bmatrix} \begin{bmatrix} h_{At-1} \\ h_{Dt-1} \end{bmatrix} \tag{6}$$

Equation (6) is known as the variance equation and it can also be rewritten in a more compact form. That is:

$$\mathbf{h_t} = \boldsymbol{\alpha_0} + \mathbf{A_1}\boldsymbol{\varepsilon}^2_{\mathbf{t-1}} + \boldsymbol{\beta_1}\mathbf{h_{t-1}} \tag{7}$$

In equation (7) $\boldsymbol{\alpha_0}$ is the intercept term, $\mathbf{A_1}$ and $\boldsymbol{\beta_1}$ denote the ARCH(1) and GARCH(1) coefficients, respectively. Finally, the covariance equation capturing the co-volatility between the two series is given by:

$$Cov(A, D) = \lambda\sqrt{h_{At}h_{Dt}} \tag{8}$$

For the majority of the 49 countries the SIC was more supportive of the CCC version of the GARCH (1,1) model than those for the diagonal vector GARCH (VECH) model proposed by Bollerslev et al. (1988) and the diagonal BEKK (Baba-Engle-Kraft-Kroner) model developed in Engle and Kroner (1995). The CCC model is considered as an effective way to solve the curse of dimensionality problem in MGARCH models. We are particularly interested in comparing the magnitude of the estimated ARCH and λ coefficients in different markets. If λ is positive and statistically significant, there will be evidence of the co-volatility between y_{At} and y_{Dt}, whereby the divergence of the two series can increase the volatility of each series.

IV. Data

In the Australian Bureau of Statistics (ABS, 2016) database, there are 49 countries (or groups of countries) for which monthly time series data (seasonally adjusted) for both short-term (less than one year) arrival and departure series are available for the period 1991m1-2014m7. The sample period covers 283 monthly observations for each series which is listed alphabetically within the following 9 ABS geographical clusters: Oceania and Antarctica; North-West Europe; Southern and Eastern Europe; North Africa/the Middle East; South-East Asia; North-East Asia; Southern and Central Asia; Americas; and Sub-Saharan Africa. For consistency we maintain the same geographical and alphabetical ordering throughout each of the tables and figures.

Table 1 shows the mean and standard deviation for all 49 pairwise arrival and departure series during the sample period along with the corresponding results of equality tests for means and variances. The five largest average inbound arrivals are from New Zealand (71,999 people per annum), Japan (49,895) UK (45,947), the USA (33,780) and China (20,498). These five countries also possess the largest standard deviations. The penultimate column of Table 1 shows the ANOVA test for the equality of means for arrival and departure series. The null hypothesis of equality of means is rejected at the 5% level of significance for all pairs except the following seven countries or group of countries: Total Oceania and Antarctica, France, Israel, United Arab Emirates, Malaysia, Other North-East Asia, and South Africa. The final column of Table 1 shows the results of equality of variances using the Brown and Forsythe (1974) test. The null hypothesis of equality in this test is also rejected for all markets with the exception of Canada. Therefore, there is little statistical evidence of equality of means and variances for pairwise arrival and departure series.

[TABLE 1, FIGURES 1 AND 2 ABOUT HERE]

To obtain an understanding of the relative market size, we present the actual number of arrival (solid lines) and departure (dotted lines) series from all 49 countries during the sample period (1991m1-2014m7) in country-specific graphs in Figure 1. Since large variations in one series may mask small changes in the other, we have facilitated pairwise comparisons by normalising both series and presented all 49 resulting graphs in Figure 2. Examination of the pairwise relationship between arrival and departure series in Figure 2 reveals that, when both series move together, the corresponding arrival series appear to be less oscillatory as noted in the corresponding graphs for New Zealand, Total Oceania and Antarctica, France, Germany, Italy, Vietnam, Malaysia, the Philippines, China, India, Sri Lanka, total Southern and Central Asia, and Canada. Put otherwise, when the variations in the two series are vastly different, the corresponding arrival series exhibits wild fluctuations over time; see, for example, New Caledonia, Austria, Netherlands, Israel, Thailand, Indonesia, Japan, South Korea, and South Africa. These observations, based on eyeballing the graphs, are tested using more formal econometric techniques in the next section.

V. Results

In order to avoid obtaining spurious results, it is important to first examine the time series properties of the data. We have reported the results of the following two unit root tests in Table 2: Augmented Dickey-Fuller (ADF, 1981) and Zivot and Andrews (ZA, 1992). We utilised the lowest value of the Schwarz criterion to determine the optimal lag length in the testing procedure. The ADF test results suggest that 49% (24/49) of the arrival series and 53% (26/49) of the departure series are stationary in levels. However after allowing for one endogenously determined structural break, the null hypothesis of a unit root is consistently rejected for all 49 arrival and departure series at the 10% level of significance or better. The estimated break date for most arrival series (26 countries) and departure series (37 countries) occurred in 1994, coinciding with the same year when a change in the “entry permit” system was introduced, affecting travel requirements to Australia.

[TABLE 2 ABOUT HERE]

Given the unit root test results in Table 2, it is thus safe to assume that all arrival and departure series are I(0) and, as a result, any exogenous shocks influencing both series have only a temporary effect. Since all variables are stationary in levels, we did not undertake a pairwise cointegration test in this study. Instead, we adopted an asymmetric version of the Granger (1980) causality test within a VAR system whereby the responsiveness of each series is modelled over time using logarithmic differences. The use of growth rates ensures that the sum of the estimated ARCH and GARCH coefficients stay well within the unit circle and Bollerslev's (1986) condition is not violated.

The causality test results are shown in Table 3, indicating that (a) positive and negative changes in 16[1] and 13[2] departure series Granger cause significant changes in arrival series, respectively; (b) positive and negative changes in 15[3] and 14[4] arrival series Granger cause significant changes in departure series, respectively. The interplay between the two series is consistent with expectations as the majority of short-run inbound tourists will have to leave Australia at their point of departure, although some may also choose to travel elsewhere.

[TABLE 3 ABOUT HERE]

The causality test results support the view that changes in departures and arrivals are interrelated for a number of countries, particularly the most populous countries such as Brazil, China, India and Indonesia. According to Table 3, for the following seven markets there is a bi-directional causality running from positive and/or negative changes in one series to the other:

[1] Brazil, Fiji, Hong Kong, India, Indonesia, Japan, New Caledonia, Other North-East Asia, Other Sub-Saharan Africa, Papua New Guinea, Singapore, Sri Lanka, Total North-West Europe, Total Southern and Central Asia, United Arab Emirates, and Vietnam.

[2] Hong Kong, India, Italy, Japan, Mexico, New Caledonia, Other Sub-Saharan Africa, Papua New Guinea, Sri Lanka, Total North-West Europe, Total Southern & Eastern Europe, Total Southern and Central Asia, and United Arab Emirates.

[3] Brazil, China, France, Greece, Mexico, Netherlands, New Zealand, Other North-East Asia, Other Sub-Saharan Africa, Sri Lanka, Taiwan, Thailand, Total Sub-Saharan Africa, Vanuatu, and Vietnam.

[4] Brazil, China, Greece, India, Netherlands, New Zealand, Poland, Spain, Sweden, Taiwan, Total North Africa & Middle East, Total Oceania and Antarctica, Total Sub-Saharan Africa, and Vanuatu.

Brazil, India, Mexico, Other North-East Asia, Other Sub-Saharan Africa, Sri Lanka, and Vietnam. These findings can also be informally confirmed by observing the systematic co-movements displayed in the corresponding graphs of the two series in Figure 2.

It is also important to note that whenever there is uni- or bi-directional causality between any of the pairs, the extent of variability in the number of arrivals seems to be relatively lower. This can be seen in Figure 2 and the corresponding starred causality test results in Table 3, where at least one of the following null hypotheses are statistically rejected: $\Delta\ln(DR^{+}_{t-j}) \not\to \Delta\ln(AR_t)$, $\Delta\ln(DR^{-}_{t-j}) \not\to \Delta\ln(AR_t)$, $\Delta\ln(AR^{+}_{t-j}) \not\to \Delta\ln(DR_t)$ and $\Delta\ln(AR^{-}_{t-j}) \not\to \Delta\ln(DR_t)$ where (-) and (+) indicate falling and rising in arrival (*AR*) or departure (*DR*) series, respectively.

In the second phase of this study we estimate equations (5), (7) and (8) using the maximum likelihood and Marquardt optimisation methods. The results are presented in Table 4. The most important coefficients in which we are interested are the ARCH (α_{A1} and α_{D2}) and covariance (λ) coefficients. All of the estimated ARCH coefficients for both arrival and departure return series are positive and statistically significant at the 10% level or better but the same thing cannot be said about the GARCH coefficients (β_{A1}, β_{D1}). The ARCH effect can be interpreted as the impact of an average shock, whereas the GARCH effect shows the resilience and inertia associated with such a shock over time.

The interpretation of the results in Table 4 is straightforward. For example, consider New Zealand (α_{A1}=0.353, λ=0.095) and China (α_{A1}=0.663, λ=0.271). Both the ARCH effect and the co-volatility coefficient for China is noticeable larger than that of New Zealand. This relative higher volatility can also be seen in Figure 1 as the corresponding arrival and departure series for China are more divergent that those for New Zealand. The five highest arrival ARCH coefficients belong to Indonesia (0.905), Italy (0.892), Brazil (0.783), Sweden (0.666) and China (0.663). The five highest departure ARCH coefficients are observed for China (0.889), Singapore (0.714), Hong Kong

(0.711), Mexico (0.693) and the UK (0.626). Another important finding in Table 4 is that the estimated co-volatility coefficient λ for 37% of cases (18/49) is both positive and statistically significant. After excluding country groupings, in descending order, the most co-volatile markets are as follows: South Africa (λ=0.274), Papua New Guinea (0.267), Hong Kong (0.217), China (0.214), the UK (0.181), Singapore (0.176). In these countries the simultaneous fluctuations in both arrival and departure return series can lead to greater market co-volatility spillovers adversely affecting the Australian tourism industry.

[TABLE 4 ABOUT HERE]

VI. Discussion and conclusion

We found that Australian inbound and outbound tourism flows were stationary and, as a result, no cointegration test was carried out. Instead, we looked at the short-term effects of positive and negative changes in one series on the other using an asymmetric version of the Granger causality test. The causality test results show that monthly changes in departures and arrivals are interrelated for a number of countries, particularly the most populous countries such as Brazil, China, India and Indonesia. We also employed a MGARCH model to ascertain if there is any discernible pattern in the co-volatility between the arrival and departure series. The results support the view that when Australian inbound and outbound tourism series for 18 countries diverge, the volatility of both series tends to be significantly higher as shown by a significant and positive λ coefficient. Consequently, we argue that unanticipated shocks, such as terrorist attacks, natural disasters or the outbreak of epidemics, do not exert the same influence on all markets. Under these circumstances, the adverse effects of global shocks on the tourism industry are anticipated to be higher than when both series are less volatile.

Our study identifies 27 out of 49 markets (or country groupings) for which the estimated λ coefficients are not statistically significant and thus they can be considered as relatively less susceptible to unanticipated global co-volatility in both arrivals and departures. These 27 markets include five country groupings (i.e. Total Oceania and Antarctica; Total Southern & Eastern Europe; Other North-East Asia; Other Sub-Saharan Africa; and Total Americas) plus the following 22 markets: Austria, Brazil, Canada, France, Germany, Indonesia, Ireland, Israel, Italy, Japan, Mexico, New Caledonia, New Zealand, Poland, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, United Arab Emirates, United States of America, and Vietnam. As can be seen these markets are from different continents and country groupings forming a diverse tourism portfolio.

On the other hand, excluding country-groupings, there are ten markets for which the estimated λ coefficient is highly significant and positive: South Africa (0.274), Papua New Guinea (0.267), Hong Kong (0.217), China (0.214), Singapore (0.176), South Korea (0.156), Malaysia (0.154), Fiji (0.137), India (0.128), and the Philippines (0.126). One can thus describe these markets more susceptible to unanticipated global co-volatility in both arrivals and departures. As can be seen, most of these fragile markets are heavily concentrated in South-East Asia. China is by far the largest of these markets constituting 13.78% and 4.54% of total arrivals and departures in 2015, respectively, and is the strongest market for Australia in terms of visitor expenditure (Tourism Research Australia, 2016). According to Table 5, while the share of North-West Europe from total arrivals fell from 20.2% in 1991 to 17.5% in 2015, the share of South-East Asia rose from 9.2% to 15.3% during the same period. A similar pattern emerges using total departures. In addition, from a larger base, the annual average growth rate of departures for the South-East Asia group is also higher than that of North-West Europe.

[TABLE 5 ABOUT HERE]

The largest VFR markets for Australia are Asia, New Zealand, the US and the UK. VFR is Australia's largest visiting segment out of the UK, representing 43 per cent of all visitors aged 15 years and above, and contributing 30 per cent (A$910 million) of total UK visitor spending

(Tourism Australia, 2014). This reflects the fact that the UK has been a major source of immigrants to Australia over a long period. According to Tourism Australia (2013), VFR represents just under one-third (31 per cent) of tourist arrivals from New Zealand and just under one quarter of tourist arrivals from the US (23 per cent). The importance of New Zealand reflects the surge in New Zealand migration to Australia following the signing of the Australia-New Zealand Closer Economic Relations Trade Agreement.

Asia, as a whole, is a major VFR market for Australia with VFR tourism representing 37 per cent of total arrivals from Vietnam, 27 per cent of total arrivals from Thailand, 22 per cent of total arrivals from Malaysia, 17 per cent of total arrivals from China, 16 per cent of total arrivals from Indonesia and 15 per cent of total arrivals from Malaysia (Tourism Australia, 2013). Asia has been the main focus of growth in VFR. A report by Tourism Research Australia (2016) for the year ending 2015, notes that while overall leisure tourism grew by 10 per cent, VFR arrivals increased by seven per cent over the same 12 month period. In keeping with Dwyer et al's (2010) contention that migration to Australia has had a growing focus on Asia, much of this growth has come from the Asian region. Several of the countries found to be less susceptible to unanticipated global shocks have a high proportion of VFR tourism; particularly, New Zealand, the US and several Asian countries including Indonesia, Thailand and Vietnam. The main market that has a high proportion of VFR tourism and is more susceptible to unanticipated global co-volatility in both arrivals and departures is the UK, with China, Malaysia and Singapore being less important VFR markets.

By understanding the volatility of these tourism markets, tailored strategies can be developed to improve tourism performance and proactively manage tourism demand. These strategies could include, for example, VFR tourism to increase inbound tourism flows from those markets which, have been found to be resilient and thus have the potential to provide ongoing and significant tourist arrivals. The reason why VFR tourism is more resilient than non-VFR tourism is that it involves a specific purpose (visiting friends and relatives). There may be several alternative close substitutes for non-VFR tourism. For example the beaches of Bali, Ibiza, Phuket or Hawaai are likely to be close substitutes for the beaches of Queensland's Gold Coast. However, if one's friends and relatives are located in a particular country, it is not possible to visit them elsewhere. Hence, it has been argued that VFR tourism to Australia is less likely to drop off substantially when the Australian dollar appreciates or in times of economic downturn in the home country (Backer, 2008). When this occurs, however, non-VFR tourists are likely to choose substitutes which have a weaker currency or are located closer to home. For instance, non-VFR tourists from the UK may go to the Costa Del Sol or Ibiza and non-VFR tourists from China to Phuket or Bali. The latter point is particularly relevant given Australia is a long haul destination for most tourist markets.

Dwyer et al. (2010) contend that migration to Australia has had a growing focus on Asia and Australian Government reforms have also shown how streamlined processes can assist in stimulating inbound tourism from China (Breakey et al., 2008). Given that tourism is sensitive to unexpected events and there is considerable volatility in tourism demand, diversifying the tourism market portfolio can reduce reliance on a few key markets and support the economy in times of crisis. Consequently, it is suggested that contingency planning should involve a combination of supportive policy and targeted marketing and promotional strategies as a means to further improve tourism from those countries that we identify as least vulnerable to downturns. From a practical perspective, Australia already invests heavily in marketing to its major tourism markets and studies have shown that this marketing investment provides a significant return. Indeed, Kulendran and Dwyer (2009) found that Australian tourism marketing expenditure in Asia including Hong Kong, India, South Korea, Malaysia, the Philippines, Singapore and Thailand provided a better return on investment than marketing to Australia's more established inbound markets such as New Zealand, the UK, the US and Japan. As a result, we recommend allocating additional resources to mitigate the volatility in those markets that our study has identified with relatively high arrival/departure ARCH coefficients, specifically: Brazil, China, Hong Kong, Indonesia, Ireland, Israel, Italy, Malaysia, Mexico and New Zealand. This strategy could maintain market share, improve overall tourism yield, sustain tourism infrastructure and retain employment levels pending the recovery of traditional markets. Such a balanced approach to tourism promotion has the potential not only to reduce the impact of downturns in major markets, but is also likely to be cost-effective in terms of marketing spend.

In conclusion, our study shows that there are a number of inbound or outbound markets that are more volatile during downturns in tourism demand. We suggest that VRF tourism is the most likely reason for this resilience and present this as a valuable source of revenue for DMOs to tap into during times of crisis. While the literature does highlight the relationship between migration and tourism, the patterns of tourism that result from migration have not been studied on a consistent basis over time. The changing face of migration requires continual research to understand current and future opportunities related to VFR tourism. As a result, further research could include developing a comprehensive understanding of the travel motivations of VFR tourists along with the socio-graphic and demographic profiles of this important tourist sector. Engaging with diaspora could also assist in understanding the changing nature of migration and its impact on mobility, connectedness and future tourism flows.

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Table 1. Tests of equality between monthly short-term arrivals and departures.

Country of origin/departures	Monthly arrivals (Persons)		Monthly departures (persons)		Tests of equality	
	Mean	Std. Dev.	Mean	Std. Dev.	Means: Anova test $F(1,564)$	Variances: Brown-Forsythe test $F(1,564)$
New Zealand	71999	21941	57877	24541	52.1***	6.0**
New Caledonia	2620	858	1314	316	577.1***	371.6***
Papua New Guinea	3367	772	4186	1731	52.9***	50.2***
Vanuatu	506	226	3162	1410	979.0***	405.3***
Fiji	1996	402	13992	7937	644.8***	404.4***
Total Oceania & Antarctica	82751	23694	86297	36595	**1.9**	60.4***
UK	45947	13369	30594	8450	266.6***	33.2***
Ireland	3665	1779	2606	1321	64.7***	24.4***
Austria	1384	239	887	321	438.4***	41.3***
France	5177	2387	5517	3295	**2.0**	18.2***
Germany	11655	2135	4313	1706	2043.2***	8.8***
Netherlands	3816	930	1641	529	1169.8***	43.3***
Switzerland	3465	549	1252	454	2734.7***	3.2*
Sweden	2556	629	712	331	1904.8***	99.9***
Total North-West Europe	82318	21939	49112	16412	415.7***	13.5***
Italy	4034	1131	7495	3477	253.6***	212.9***
Spain	1264	664	1837	1248	46.5***	58.0***
Greece	631	161	3624	1049	2250.8***	333.9***
Poland	544	288	759	321	70.5***	3.2*
Total Southern & Eastern Europe	9696	3541	19667	8197	352.9***	148.8***
Israel	977	315	969	473	**0.1**	27.6***
United Arab Emirates	1381	962	1495	1356	**1.4**	26.1***
Total North Africa & Middle East	4862	2338	9301	4935	187.0***	137.9***
Thailand	5689	1473	20714	15749	255.4***	245.2***
Vietnam	1365	1078	8518	5953	395.7***	335.9***
Indonesia	8412	2725	32967	21922	349.7***	134.1***
Malaysia	13065	5295	12602	5758	**1.0**	5.9**
Philippines	3146	1230	6998	3679	279.1***	94.8***
Singapore	20160	5379	14507	6540	126.1***	11.0***
Total South-East Asia	52962	15120	99249	59896	158.9***	135.1***
China	20498	18453	14533	10834	22.0***	43.5***
Hong Kong	11656	2633	14166	3176	104.8***	28.5***
Taiwan	9081	2832	2967	713	1240.2***	237.5***
Japan	49895	14101	7911	4362	2289.7***	195.0***
Korea, South	14526	6036	2306	1217	1114.6***	216.5***
Other North-East Asia	298	194	319	290	**1.0**	19.7***
Total North-East Asia	105949	19116	42200	19634	1531.6***	4.7**
India	5572	4442	7497	6018	18.7***	11.0***
Sri Lanka	850	445	1943	1352	166.8***	103.2***
Total Southern and Central Asia	7373	5555	12087	9188	54.5***	31.2***
Canada	7810	2566	6087	2485	65.8***	1.0
USA	33780	7077	38066	17053	15.3***	51.1***
Brazil	1242	912	746	873	43.7***	15.7***
Mexico	390	199	545	435	29.7***	54.8***
Total Americas	45131	11244	48277	21531	4.7**	36.1***
South Africa	4015	1325	3809	2201	**1.8**	75.9***
Other Sub-Saharan Africa	1436	568	2082	1353	54.7***	73.7***
Total Sub-Saharan Africa	5454	1762	6576	3688	21.3***	102.9***
Grant Total	396852	94251	373702	176254	3.8**	59.4***

Note: *, ** and *** indicate that the corresponding null hypothesis is rejected at the 1%, 5% and 10%, respectively.

Table 2. ADF and Zivot-Andrews (ZA) test results.

Origin/destination countries	Arrival series				Departure series			
	Level			Δ	Level			Δ
	ADF *t*-stat.	ZA min *t* stat.	Break date	ADF *t*-stat.	ADF *t*-stat.	ZA min *t* stat.	Break date	ADF *t*-stat.
New Zealand	-2.35	-4.73*	2008:08	-13.93***	-3.30*	-5.09**	1995:04	-13.15***
New Caledonia	-2.31	-4.71*	2011:03	-14.47***	-12.91***	-5.06**	1995:02	-10.70***
Papua New Guinea	-1.54	-4.71*	2011:03	-12.08***	-1.24	-5.06**	1995:02	-12.30***
Vanuatu	-13.65***	-8.25***	2009:05	-12.32***	-4.80***	-5.06**	1995:02	-14.39***
Fiji	-11.40***	-8.04***	1995:02	-12.76***	-3.61**	-5.06**	1995:02	-21.99***
Total Oceania and Antarctica	-2.46	-8.04***	1995:02	-13.74***	-2.85	-5.06**	1995:02	-19.81***
UK	-1.22	-7.99***	1994:11	-13.51***	-6.00***	-5.01**	1994:11	-11.97***
Ireland	-1.32	-7.97***	1994:10	-14.61***	-7.17***	-5.01**	1994:11	-10.16***
Austria	-3.03	-7.97***	1994:10	-14.37***	-13.99***	-6.11***	1999:06	-12.96***
France	-2.71	-7.97***	1994:10	-13.22***	-3.30*	-5.62***	1995:05	-20.88***
Germany	-4.16***	-4.78*	2001:08	-13.21***	-3.56**	-5.18**	2010:05	-14.68***
Netherlands	-1.48	-4.26*	1994:10	-12.52***	-5.78***	-4.99**	1994:10	-11.76***
Switzerland	-4.01***	-4.26*	1994:10	-13.75***	-15.34***	-8.78***	2005:05	-11.48***
Sweden	-3.18*	-4.26*	1994:10	-13.76***	-16.11***	-8.10***	1995:02	-11.71***
Total North-West Europe	-1.31	-4.26*	1994:10	-12.82***	-2.31	-8.03***	1994:11	-12.18***
Italy	-5.36***	-7.56***	2001:05	-11.21***	-4.13***	-8.03***	1994:11	-13.41***
Spain	-5.51***	-5.46***	1995:01	-24.41***	-2.52	-8.03***	1994:11	-15.26***
Greece	-8.09***	-6.22***	2002:08	-12.32***	-11.63***	-8.03***	1994:11	-13.06***
Poland	-12.22***	-7.35***	2003:01	-16.14***	-14.52***	-8.03***	1994:11	-11.73***
Total Southern & Eastern Europe	-5.52***	-7.37***	2000:12	-12.90***	-3.01	-7.94***	1994:10	-12.80***
Israel	-1.57	-5.56***	1995:01	-13.35***	-2.86	-7.94***	1994:10	-12.77***
United Arab Emirates	-5.82***	-6.68***	2006:07	-12.92***	-3.22*	-7.94***	1994:10	-12.97***
Total North Africa & Middle East	-5.55***	-5.89***	1994:09	-15.29***	-3.37*	-7.94***	1994:10	-16.70***
Thailand	-3.97***	-5.89***	1994:09	-12.06***	-2.07	-7.94***	1994:10	-25.93***
Vietnam	-1.01	-5.89***	1994:09	-14.74***	-2.24	-7.94***	1994:10	-14.84***
Indonesia	-2.09	-5.89***	1994:09	-14.66***	-0.34	-7.94***	1994:10	-22.08***
Malaysia	-2.5	-5.89***	1994:09	-18.30***	-1.89	-7.94***	1994:10	-13.62***
Philippines	-1.96	-5.89***	1994:09	-12.80***	-0.74	-7.94***	1994:10	-14.74***
Singapore	-2.57	-5.89***	1994:09	-18.44***	-2.52	-7.94***	1994:10	-16.57***
Total South-East Asia	-2	-5.89***	1994:09	-13.91***	-0.54	-7.94***	1994:10	-16.58***
China	0.76	-5.89***	1994:09	-12.20***	-3.20*	-7.94***	1994:10	-17.72***
Hong Kong	-2.53	-5.89***	1994:09	-13.55***	-4.80***	-7.94***	1994:10	-25.28***
Taiwan	-3.39**	-5.89***	1994:09	-13.02***	-12.85***	-7.94***	1994:10	-12.01***
Japan	-3.84**	-5.89***	1994:09	-20.89***	-3.28*	-7.94***	1994:10	-26.05***
Korea, South	-2.36	-5.89***	1994:09	-15.56***	-0.26	-7.94***	1994:10	-12.05***
Other North-East Asia	-3.40**	-5.89***	1994:09	-16.67***	-12.97***	-7.94***	1994:10	-11.24***
Total North-East Asia	-3.93***	-4.58*	2007:04	-19.31***	-3.28*	-7.94***	1994:10	-22.75***
India	-0.68	-4.46*	1994:08	-14.27***	0.52	-7.94***	1994:10	-11.56***
Sri Lanka	-1.95	-4.46*	1994:08	-10.47***	-0.72	-7.94***	1994:10	-11.43***
Total Southern and Central Asia	0.6	-4.46*	1994:08	-14.12***	0.56	-7.94***	1994:10	-5.05***
Canada	-4.20***	-4.46*	1994:08	-12.89***	-10.93***	-7.94***	1994:10	-14.72***
United States of America	-4.37***	-4.61*	1997:12	-18.65***	-0.86	-4.68*	2011:02	-17.60***
Brazil	-1.36	-4.46*	1994:08	-15.14***	1.77	-4.46*	1994:08	-7.91***
Mexico	-12.82***	-4.98**	1999:10	-11.60***	-12.22***	-4.46*	1994:08	-12.62***
Total Americas	-4.82***	-5.89***	1997:12	-12.27***	-0.85	-4.46*	1994:08	-16.92***
South Africa	-2.95	-5.12**	1995:05	-19.98***	-5.79***	-4.46*	1994:08	-13.23***
Other Sub-Saharan Africa	-13.37***	-5.09**	1995:04	-15.07***	-1.09	-4.46*	1994:08	-15.04***
Total Sub-Saharan Africa	-3.26*	-5.09**	1995:04	-20.33***	-2.14	-4.46*	1994:08	-14.03***
Grant Total	-3.52**	-5.09**	1995:04	-23.63***	-0.79	-4.46*	1994:08	-18.14***

Note: *, ** and *** indicate that the corresponding null hypothesis is rejected at the 1%, 5% and 10%, respectively.

Table 3. Asymmetric Granger causality test results.

Null hypothesis	$\theta_1^+ = \theta_2^+ = ... = \theta_k^+ = 0$	$\theta_1^- = \theta_2^- = ... = \theta_k^- = 0$	$\varphi_1^+ = \varphi_2^+ = ... = \varphi_k^+ = 0$	$\varphi_1^- = \varphi_2^- = ... = \varphi_k^- = 0$
Causality direction	$\Delta\ln(DR_{t-j}^+) \not\rightarrow \Delta\ln(AR_t)$	$\Delta\ln(DR_{t-j}^-) \not\rightarrow \Delta\ln(AR_t)$	$\Delta\ln(AR_{t-j}^+) \not\rightarrow \Delta\ln(DR_t)$	$\Delta\ln(AR_{t-j}^-) \not\rightarrow \Delta\ln(DR_t)$
New Zealand	1.48	1.01	2.22*	2.37**
New Caledonia	2.53**	2.07*	1.34	1.14
Papua New Guinea	2.25*	2.14*	0.55	0.74
Vanuatu	1.08	1.87	3.99***	2.16*
Fiji	3.58***	1.42	1.27	1.26
Total Oceania and Antarctica	1.42	1.08	1.48	2.01*
UK	1.72	1.85	0.96	1.25
Ireland	0.70	0.50	0.11	0.80
Austria	0.92	0.84	1.20	0.82
France	1.88	0.99	2.74**	0.79
Germany	0.80	1.72	1.05	1.36
Netherlands	0.41	0.55	4.10***	2.73**
Switzerland	0.80	1.47	1.27	0.72
Sweden	0.85	0.72	0.28	1.96*
Total North-West Europe	2.76**	2.93**	0.43	0.57
Italy	1.91	3.24***	1.13	0.83
Spain	1.92	1.72	1.87	2.74**
Greece	0.87	0.87	2.64**	2.65**
Poland	1.06	1.07	0.76	4.25***
Total Southern/Eastern Europe	1.90	2.19*	1.22	0.52
Israel	1.21	0.83	0.65	1.02
United Arab Emirates	2.30*	2.05*	1.89	1.43
Total North Africa/Middle East	0.58	0.43	0.87	2.02*
Thailand	0.35	0.39	2.04*	1.81
Vietnam	2.06*	1.32	2.23*	1.49
Indonesia	1.94*	1.23	0.62	0.70
Malaysia	0.76	0.28	0.47	1.82
Philippines	0.92	0.35	0.77	1.21
Singapore	2.38**	1.67	1.40	1.48
Total South-East Asia	1.92	1.01	0.85	0.85
China	0.44	1.23	1.98*	2.35**
Hong Kong	3.81***	3.07**	0.69	0.68
Taiwan	0.44	0.46	2.25*	2.00*
Japan	2.12*	2.10*	1.70	1.71
Korea, South	1.46	1.88	1.06	1.14
Other North-East Asia	4.03***	1.72	5.14***	1.45
Total North-East Asia	0.86	0.18	1.74	1.90
India	3.80***	3.73***	1.78	2.18*
Sri Lanka	2.74**	4.76***	2.02*	0.72
Total Southern and Central Asia	7.01***	5.07***	0.55	0.90
Canada	1.17	1.64	1.06	0.60
United States of America	1.05	1.69	1.44	1.46
Brazil	3.68***	1.72	5.48***	6.67***
Mexico	1.00	2.05*	2.09*	0.17
Total Americas	0.60	1.63	0.78	0.51
South Africa	1.35	1.58	0.66	1.04
Other Sub-Saharan Africa	3.79***	3.39***	2.45**	1.91
Total Sub-Saharan Africa	0.60	1.74	2.41**	2.31*
Grant Total	1.35	1.84	0.34	0.27

Note: *, ** and *** indicate that the corresponding null hypothesis is rejected at the 1%, 5% and 10%, respectively.

Table 4. Estimated MGARCH model.

Country		Mean equation		Variance equation						Covariance equation	SIC
		γ_A	γ_D	α_{A0}	α_{A1}	β_{A1}	α_{D0}	α_{D2}	β_{D2}	λ	
New Zealand	Coeff.	0.001	0.005	0.003	0.353	0.095	0.002	0.552	-0.081	0.066	758.2
	p-value	0.83	0.07	0.00	0.00	0.41	0.00	0.00	0.11	0.25	
New Caledonia	Coeff.	0.003	-0.009	0.012	0.502	0.088	0.003	0.263	0.741	0.005	116.1
	p-value	0.68	0.46	0.00	0.00	0.16	0.09	0.00	0.00	0.94	
Papua New Guinea	Coeff.	0.001	0.002	0.009	0.317	-0.097	0.002	0.449	0.525	**0.267**	427.4
	p-value	0.80	0.67	0.00	0.00	0.67	0.01	0.00	0.00	0.00	
Vanuatu	Coeff.	-0.009	0.000	0.066	0.410	0.137	0.011	0.404	0.264	**-0.098**	15.6
	p-value	0.59	0.95	0.00	0.00	0.21	0.00	0.00	0.03	0.10	
Fiji	Coeff.	0.002	0.003	0.005	0.434	0.354	0.006	0.461	0.185	**0.137**	401.0
	p-value	0.70	0.55	0.00	0.00	0.00	0.00	0.00	0.09	0.02	
Oceania and Antarctica	Coeff.	0.000	0.004	0.002	0.418	0.097	0.001	0.395	0.209	0.070	849.0
	p-value	0.95	0.06	0.00	0.00	0.38	0.00	0.00	0.11	0.20	
UK	Coeff.	0.006	0.003	0.006	0.366	-0.077	0.004	0.626	0.003	**0.181**	608.3
	p-value	0.25	0.33	0.00	0.00	0.01	0.00	0.00	0.96	0.01	
Ireland	Coeff.	0.014	-0.001	0.011	0.539	-0.012	0.043	0.330	-0.218	0.005	209.2
	p-value	0.05	0.92	0.00	0.00	0.91	0.00	0.00	0.14	0.94	
Austria	Coeff.	0.001	-0.001	0.007	0.372	0.191	0.081	0.381	-0.076	0.053	125.6
	p-value	0.84	0.97	0.00	0.00	0.06	0.00	0.00	0.41	0.43	
France	Coeff.	0.006	0.011	0.005	0.467	0.119	0.016	0.433	0.075	-0.001	374.2
	p-value	0.23	0.16	0.00	0.00	0.31	0.00	0.00	0.35	0.98	
Germany	Coeff.	0.006	-0.007	0.001	0.413	0.436	0.049	0.412	0.042	0.085	293.6
	p-value	0.09	0.64	0.00	0.00	0.00	0.00	0.00	0.50	0.28	
Netherlands	Coeff.	0.000	-0.007	0.002	0.424	0.418	0.049	0.392	0.048	**-0.126**	275.9
	p-value	0.90	0.66	0.00	0.00	0.00	0.00	0.00	0.47	0.08	
Switzerland	Coeff.	0.005	-0.003	0.003	0.431	0.273	0.045	0.389	0.044	-0.079	243.0
	p-value	0.21	0.84	0.00	0.00	0.01	0.00	0.01	0.82	0.21	
Sweden	Coeff.	0.003	-0.027	0.007	0.666	-0.075	0.108	0.487	0.032	0.021	81.1
	p-value	0.49	0.17	0.00	0.00	0.07	0.00	0.00	0.61	0.75	
North-West Europe	Coeff.	0.006	0.006	0.002	0.390	-0.072	0.004	0.458	0.003	**0.191**	755.7
	p-value	0.04	0.10	0.00	0.00	0.01	0.00	0.00	0.97	0.00	
Italy	Coeff.	0.010	0.003	0.003	0.892	0.307	0.011	0.352	0.233	0.057	352.6
	p-value	0.03	0.69	0.00	0.00	0.00	0.00	0.00	0.02	0.47	
Spain	Coeff.	0.010	0.021	0.023	0.478	0.124	0.078	0.387	-0.164	**-0.133**	-8.4
	p-value	0.26	0.18	0.00	0.00	0.03	0.00	0.00	0.01	0.07	
Greece	Coeff.	0.009	0.002	0.030	0.237	0.288	0.023	0.459	0.048	**-0.109**	62.5
	p-value	0.54	0.84	0.00	0.03	0.07	0.00	0.00	0.57	0.09	
Poland	Coeff.	0.004	0.002	0.039	0.355	0.059	0.016	0.160	0.771	-0.069	-156.5
	p-value	0.80	0.94	0.00	0.00	0.63	0.05	0.00	0.00	0.38	
Southern & Eastern Europe	Coeff.	0.013	0.005	0.006	0.385	0.301	0.006	0.323	0.116	0.094	456.1
	p-value	0.05	0.32	0.00	0.01	0.00	0.00	0.00	0.55	0.24	
Israel	Coeff.	0.006	-0.013	0.008	0.491	0.241	0.039	0.321	0.464	0.082	22.0
	p-value	0.38	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.23	
United Arab Emirates	Coeff.	0.000	0.009	0.001	0.012	0.960	0.000	0.018	0.973	-0.067	-199.8
	p-value	0.99	0.56	0.02	0.08	0.00	0.77	0.07	0.00	0.39	
North Africa & Middle East	Coeff.	0.006	0.007	0.006	0.257	0.301	0.010	0.287	0.308	**0.213**	347.1
	p-value	0.31	0.36	0.03	0.01	0.20	0.00	0.00	0.02	0.00	
Thailand	Coeff.	0.006	0.007	0.003	0.414	0.568	0.003	0.367	0.393	0.097	370.6
	p-value	0.45	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.19	
Vietnam	Coeff.	0.014	0.011	0.001	0.215	0.767	0.000	0.049	0.934	0.079	189.4
	p-value	0.10	0.19	0.12	0.00	0.00	0.06	0.00	0.00	0.27	

Indonesia	Coeff.	0.010	0.000	0.007	0.905	-0.002	0.008	0.588	-0.068	-0.034	434.3
	p-value	0.01	0.99	0.00	0.00	0.96	0.00	0.00	0.00	0.59	
Malaysia	Coeff.	0.010	0.006	0.014	0.485	-0.041	0.008	0.287	0.280	**0.154**	335.1
	p-value	0.18	0.40	0.00	0.00	0.77	0.00	0.01	0.14	0.01	
Philippines	Coeff.	0.001	0.006	0.007	0.561	-0.050	0.007	0.455	0.146	**0.126**	439.4
	p-value	0.87	0.30	0.00	0.00	0.44	0.00	0.00	0.24	0.02	
Singapore	Coeff.	0.005	0.009	0.003	0.395	0.368	0.007	0.714	0.093	**0.176**	466.9
	p-value	0.35	0.10	0.00	0.00	0.00	0.00	0.00	0.21	0.00	
South-East Asia	Coeff.	0.007	0.009	0.002	0.411	0.258	0.001	0.277	0.492	**0.128**	716.1
	p-value	0.05	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.01	
China	Coeff.	0.017	0.009	0.009	0.663	-0.073	0.003	0.889	0.271	**0.214**	420.3
	p-value	0.00	0.04	0.00	0.00	0.33	0.00	0.00	0.00	0.00	
Hong Kong	Coeff.	0.005	0.003	0.003	0.248	0.494	0.005	0.711	0.175	**0.217**	456.0
	p-value	0.35	0.61	0.00	0.00	0.00	0.00	0.00	0.01	0.00	
Taiwan	Coeff.	-0.001	-0.002	0.004	0.350	0.535	0.017	0.588	-0.029	0.089	250.8
	p-value	0.88	0.74	0.00	0.00	0.00	0.00	0.00	0.67	0.18	
Japan	Coeff.	0.000	0.004	0.001	0.403	0.387	0.016	0.340	-0.129	0.015	512.2
	p-value	0.96	0.60	0.00	0.00	0.00	0.00	0.01	0.08	0.83	
Korea, South	Coeff.	0.015	0.002	0.003	0.281	0.566	0.027	0.356	-0.050	**0.156**	278.0
	p-value	0.02	0.86	0.00	0.00	0.00	0.00	0.00	0.67	0.03	
Other North-East Asia	Coeff.	0.017	0.027	0.032	0.335	0.550	0.008	0.099	0.898	0.007	-741.3
	p-value	0.44	0.64	0.00	0.00	0.00	0.11	0.00	0.00	0.91	
North-East Asia	Coeff.	0.007	0.006	0.001	0.410	0.290	0.002	0.557	0.126	**0.218**	773.4
	p-value	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.16	0.00	
India	Coeff.	0.014	0.011	0.001	0.293	0.641	0.013	0.296	0.232	**0.128**	343.9
	p-value	0.01	0.27	0.00	0.00	0.00	0.00	0.00	0.06	0.01	
Sri Lanka	Coeff.	0.008	0.005	0.006	0.228	0.571	0.005	0.346	0.614	-0.055	139.2
	p-value	0.32	0.63	0.00	0.00	0.00	0.06	0.00	0.00	0.40	
Southern and Central Asia	Coeff.	0.015	0.007	0.005	0.630	0.033	0.005	0.414	0.302	**0.156**	474.8
	p-value	0.00	0.28	0.00	0.00	0.72	0.00	0.00	0.01	0.00	
Canada	Coeff.	0.006	0.005	0.002	0.175	0.600	0.004	0.419	0.418	-0.097	492.2
	p-value	0.21	0.41	0.00	0.00	0.00	0.00	0.00	0.00	0.14	
United States of America	Coeff.	0.004	0.004	0.000	0.142	0.821	0.002	0.162	0.494	0.046	623.8
	p-value	0.35	0.44	0.02	0.00	0.00	0.00	0.01	0.00	0.42	
Brazil	Coeff.	0.009	-0.002	0.012	0.783	0.181	0.255	0.512	0.072	0.103	-117.5
	p-value	0.19	0.95	0.00	0.00	0.01	0.00	0.01	0.46	0.18	
Mexico	Coeff.	0.011	-0.071	0.010	0.132	0.794	0.415	0.693	-0.013	-0.054	-420.3
	p-value	0.55	0.14	0.02	0.01	0.00	0.00	0.00	0.25	0.39	
Americas	Coeff.	0.010	0.004	0.005	0.331	-0.047	0.002	0.245	0.448	0.082	685.6
	p-value	0.01	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.11	
South Africa	Coeff.	0.005	0.013	0.007	0.516	0.188	0.006	0.538	0.441	**0.274**	252.1
	p-value	0.39	0.06	0.00	0.00	0.04	0.00	0.00	0.00	0.00	
Other Sub-Saharan Africa	Coeff.	0.015	0.009	0.033	0.490	-0.115	0.003	0.229	0.724	0.047	67.6
	p-value	0.15	0.40	0.00	0.00	0.20	0.03	0.00	0.00	0.49	
Sub-Saharan Africa	Coeff.	0.009	0.008	0.006	0.445	0.208	0.003	0.395	0.526	**0.167**	357.0
	p-value	0.12	0.19	0.00	0.00	0.11	0.01	0.00	0.00	0.00	
Grant Total	Coeff.	0.006	0.007	0.001	0.267	0.090	0.001	0.371	-0.011	**0.312**	1092.9
	p-value	0.00	0.00	0.00	0.00	0.51	0.00	0.00	0.93	0.00	

Note: The significant λ coefficients are shown in bold.

Table 5. The size and growth rates country groupings.

Country groupings	Arrivals			Departures		
	Share (%)		Annual growth rate	Share (%)		Annual growth rate
	1991	2015		1991	2015	
Oceania and Antarctica	23.9	20.0	4.1	24.9	20.1	5.5
North-West Europe	20.2	17.5	4.3	15.6	11.2	5.0
Southern and Eastern Europe	2.0	2.7	6.0	5.0	5.1	6.5
North Africa and the Middle East	0.6	1.5	8.8	1.6	2.5	8.5
South-East Asia	9.2	15.3	7.1	22.5	30.0	7.7
North-East Asia	28.1	26.2	4.6	10.5	11.4	6.8
Southern and Central Asia	0.7	4.1	12.9	1.7	4.8	11.3
Americas	14.2	11.6	4.0	16.8	13.3	5.4
Sub-Saharan Africa	0.7	1.1	6.9	0.9	1.6	8.9
Grand total	100	100	4.9	100	100	6.5

Source: Australian Bureau of Statistics (2016).

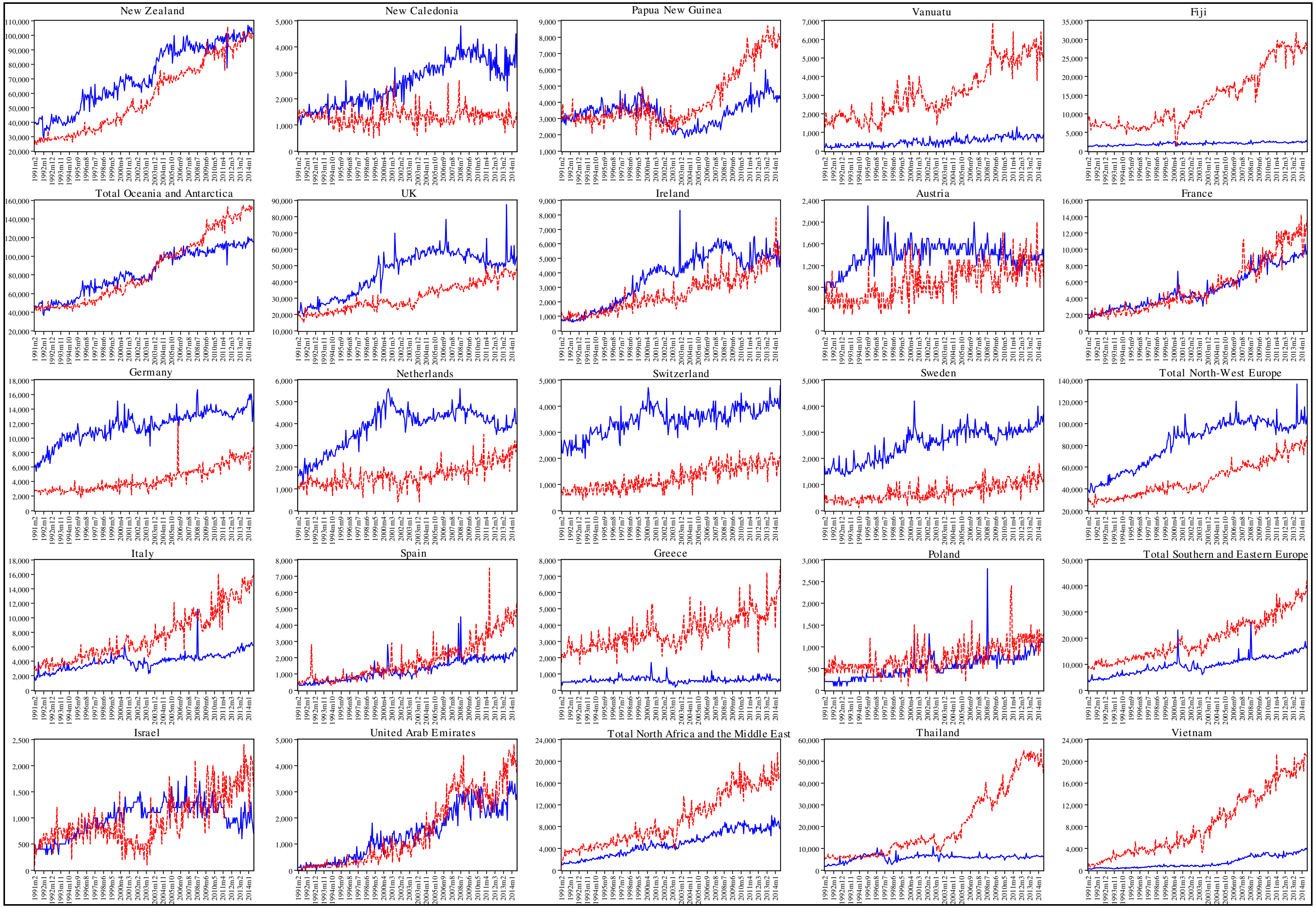

Figure 1. Number of inbound (solid blue like line) and outbound (dotted red lines) tourists to and from Australia.

Note: Inbound=solid blue lines, Outbound=dotted red lines.

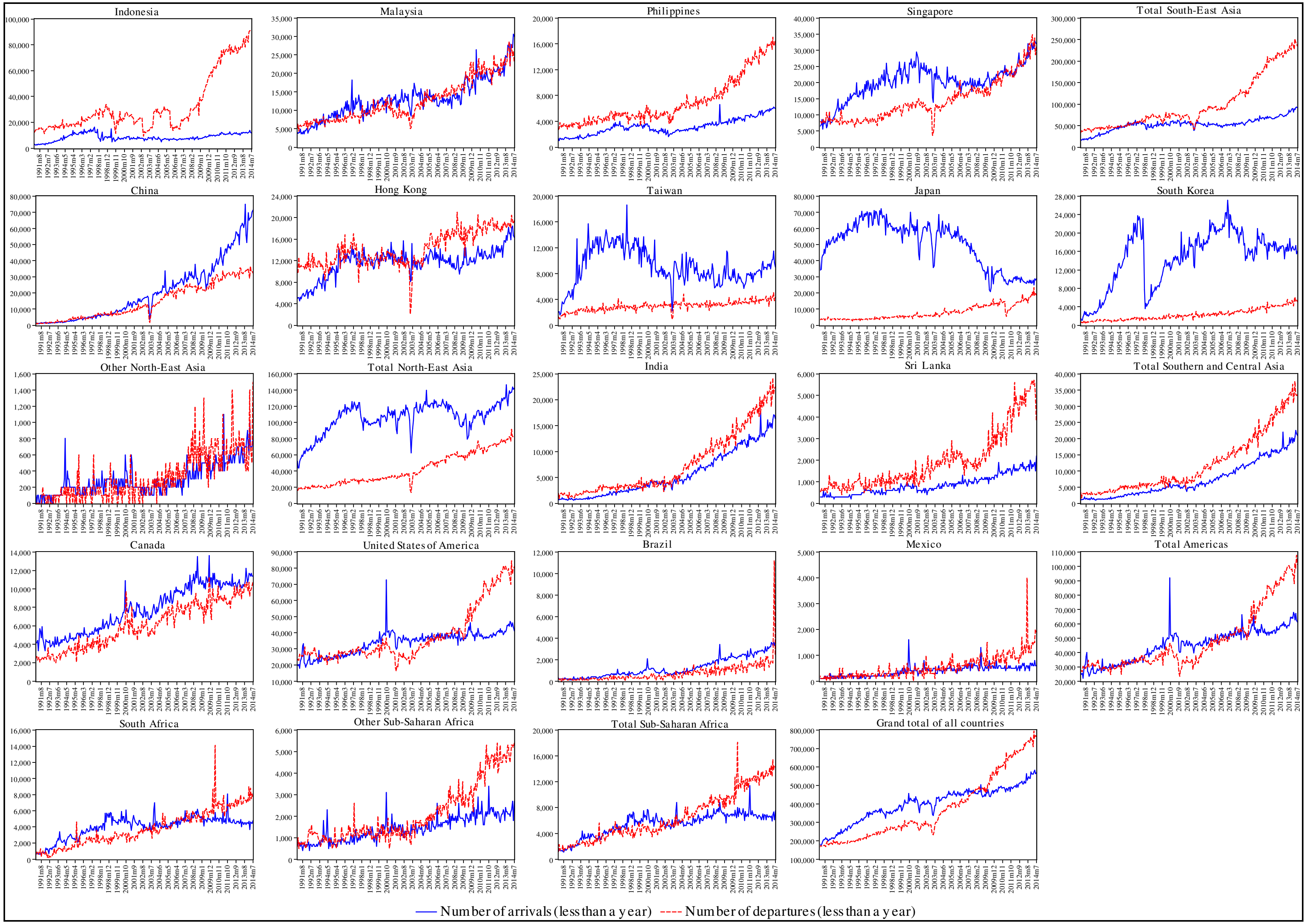

Figure 1. Number of inbound and outbound tourists to and from Australia (continued).

Note: Inbound=solid blue lines, Outbound=dotted red lines.

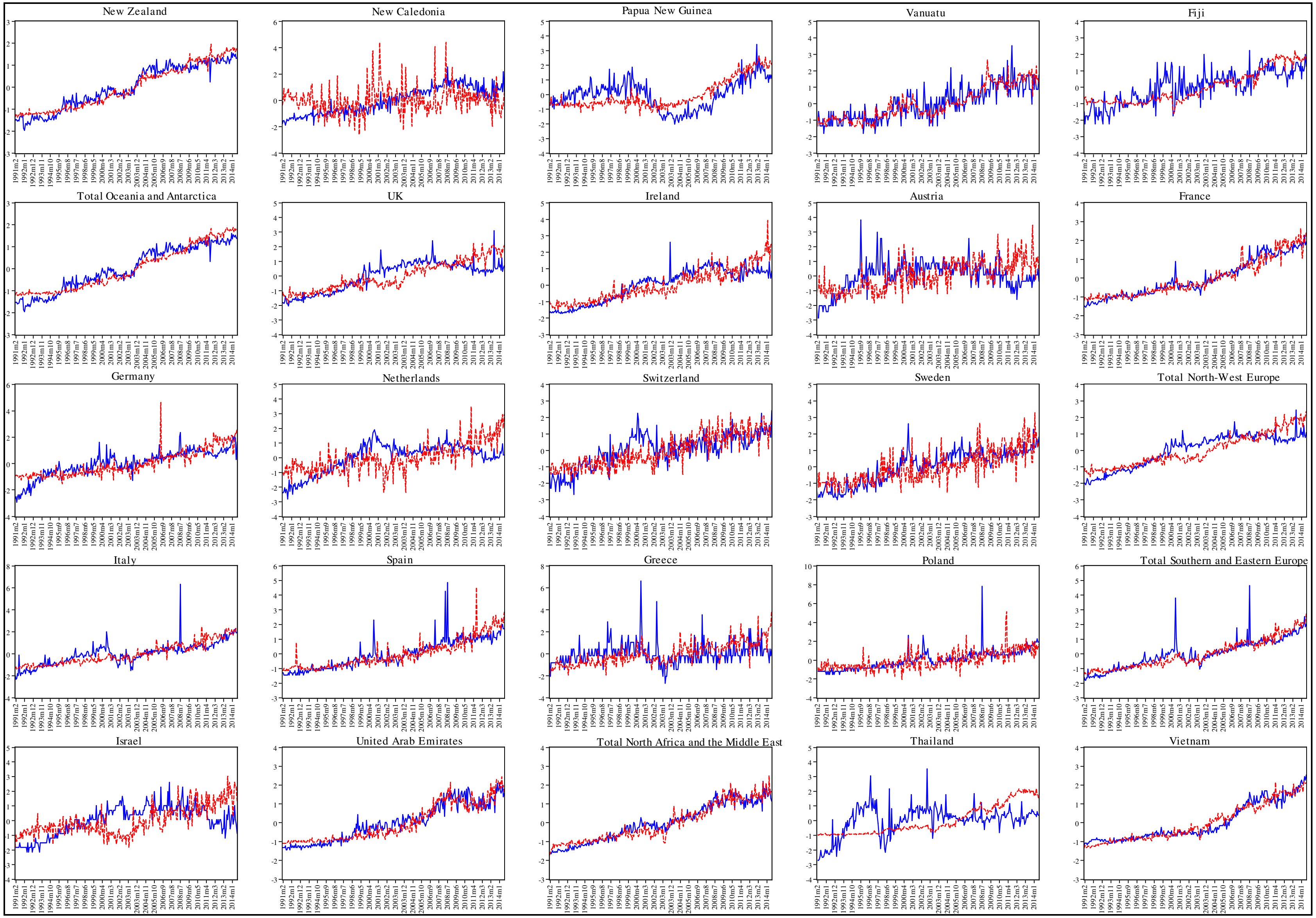

Figure 2. Normalised number of inbound and outbound tourists to and from Australia.

Note: Inbound=solid blue lines, Outbound=dotted red lines.

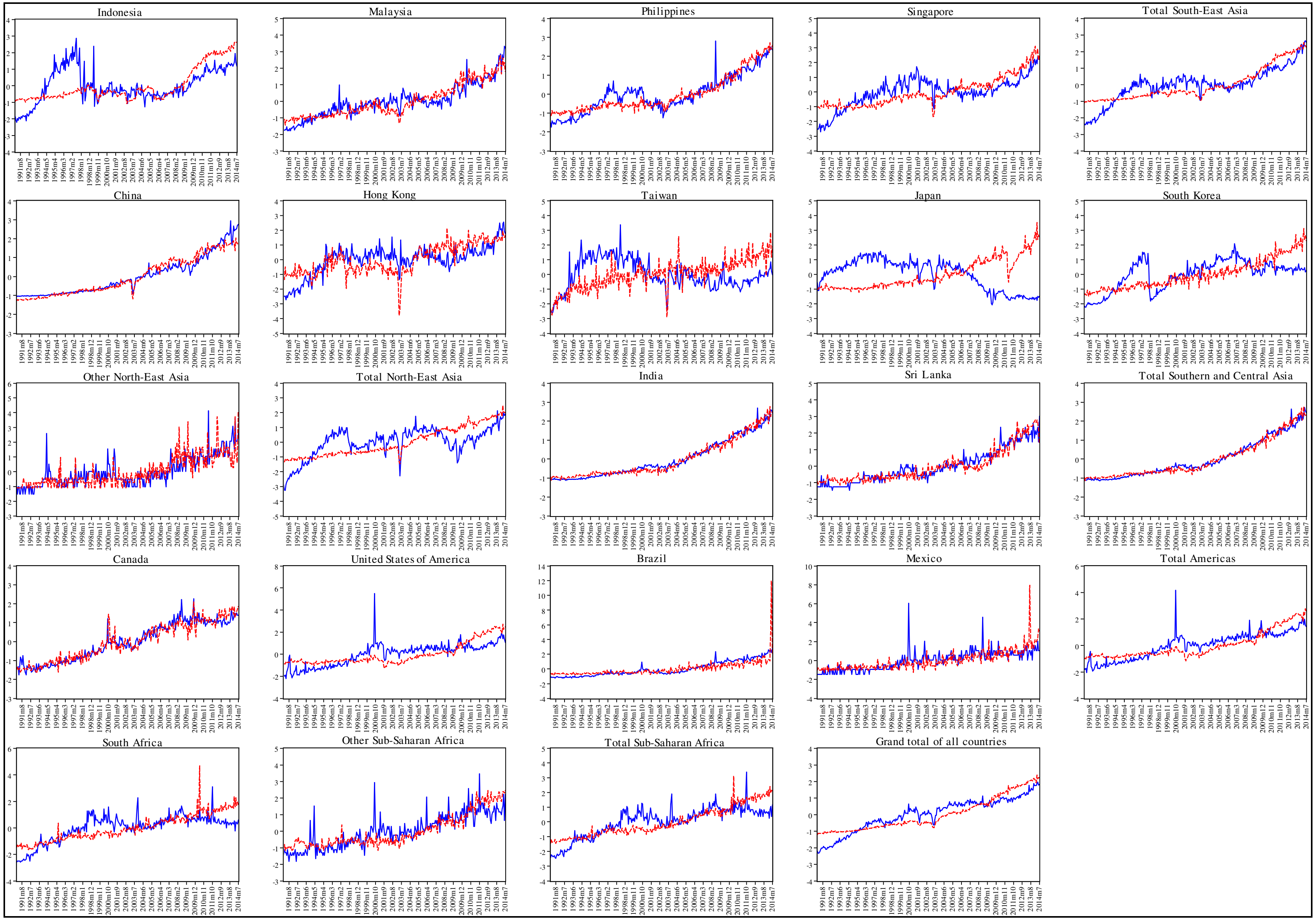

Figure 2. Normalised number of inbound and outbound tourists to and from Australia (continued).

Note: Inbound=solid blue lines, Outbound=dotted red lines.