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Drivers of Growth in the Travel and Tourism Industry in Thailand and Singapore: A Geweke Causality Analysis

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Abstract

Tourism is one of the fastest growing economic sectors in Southeast Asian countries, especially in countries such as Thailand and Singapore. The tourism and travel industry has been promoted as an integral part of the national development strategies for decades in these two countries. In this light, the paper identifies the causal determinants of the growth of the tourism and travel industry in Thailand and Singapore, using quarterly data from 2000-2012, under a Geweke causality framework. The empirical results suggest that for Thailand specifically, religious unrest, capturing an element of domestic instability and turbulence seems to affect international tourist arrivals significantly. In the case of Singapore, international tourist arrivals are driven by infrastructural variables covering airport facilities as well as policy variables, such as government expenditures on the tourism industry.

Introduction

The significance of the travel and tourism industry as a driver of economic growth and development has long been established in the economic literature. Several countries globally have seen their domestic travel and tourism industries flourish which has contributed significantly to their socio-economic development, mainly through generating employment opportunities and denting poverty rates. Boosting the local economy through the development of domestic travel and tourism industry generates both direct and indirect employment as well as

facilitates backward and forward linkages with other allied industries. This not only helps in terms of achieving greater economic growth, but also enhances a country to scale up its competitiveness in the global markets. Thus, investment in the development and promotion of tourism and travel industry remains a policy priority globally (Gopalan, 2013).

The travel and tourism industry globally in 2014 represented about 10 percent of the global output and a staggering 280 million jobs (1 in 11 jobs) for the global economy in 2014 (UNWTO, 2015). In addition, the total number of international tourist arrivals globally was over 1 billion and tourists from emerging economies represented almost half of these international arrivals. International tourism receipts crossed US$ 1 trillion worldwide in 2014, registering an increase of over 3.5 percent in real terms from 2013.

Among the various regions in the world, Europe and the Asia-Pacific regions have consistently stood out as the world's most preferred destinations, with both regions constituting 60 percent (on average) of global tourist arrivals during the last decade or so. Within the Asia and Pacific region, the Southeast Asian region spearheaded the growth in international tourist arrivals with an annual average growth of about 10 percent or so over the last decade, although it slowed down after 2013, mainly driven by the political crisis in Thailand. In terms of tourism receipts from international visitor expenditures on accommodation, food and drink, shopping and entertainment, Europe accounted for over 40 percent of worldwide international tourism receipts and also witnessed the largest increase from 2013. Consistent with the trends on international tourist arrivals, the Asia and the Pacific region cornered a 30 percent share in global tourism receipts which crossed US$ 1 trillion in 2014. Southeast Asian countries represented a third of this share within the Asia-Pacific region in 2014, in terms of international tourism receipts.

While the tourism and travel industry on the whole matters for several countries within the Southeast Asian region, two countries – Thailand and Singapore – stand out in terms of their share of international tourism receipts in the region. Both countries represent over half of the international tourism receipts generated by the Southeast Asian region on average for the last decade or so. Specifically, in the last five years after the global financial crisis, the Southeast Asian region broadly has seen a resurgence in international tourism receipts, growing from about US$ 68 billion to nearly US$ 110 billion in 2014, which translates into a jump from about 25 to 30 percent of international tourism receipts in less than five years. This growth was spearheaded by Singapore and Thailand, with the sum of international tourism receipts rising from US$ 34 billion to about US$ 58 billion during 2010 and 2014, which represented an average share of over 50 percent of receipts generated by Southeast Asia (UNWTO, 2015).

Although Thailand's tourism industry has been recognized for its resilience even during difficult times like the global financial crisis, the 2014 political turmoil in Thailand appeared to have caused a severe setback to its domestic tourism industry (Credit Suisse, 2014). This is likely to pose some macroeconomic challenges to Thailand's economy, considering that the economy is heavily reliant on the tourism industry for both as a source of exports and economic growth. Further, it is also interesting and important to note that relative tourism growth in Singapore tends to exhibit a highly positive correlation with that of Thailand. This implies that the growth of tourism industry, proxied by international tourist arrivals in Thailand, tends to co-move with that of Singapore, underlining the need to examine the drivers of tourism in both countries together (Figure 1; Credit Suisse, 2014). Further, we believe that this strong correlation, exhibited by both the countries for a sustained period of time, is another reason to believe that the causal factors determining the growth of tourism industry in both Thailand and Singapore could perhaps be similar. Finally, it is also worth emphasizing that given the significant share of tourism revenues that these two countries together represent in the Southeast Asian region, understanding the causal determinants of tourism growth in these economies will prove vital for policy makers to ensure that the industry continues to remain robust, moving forward.

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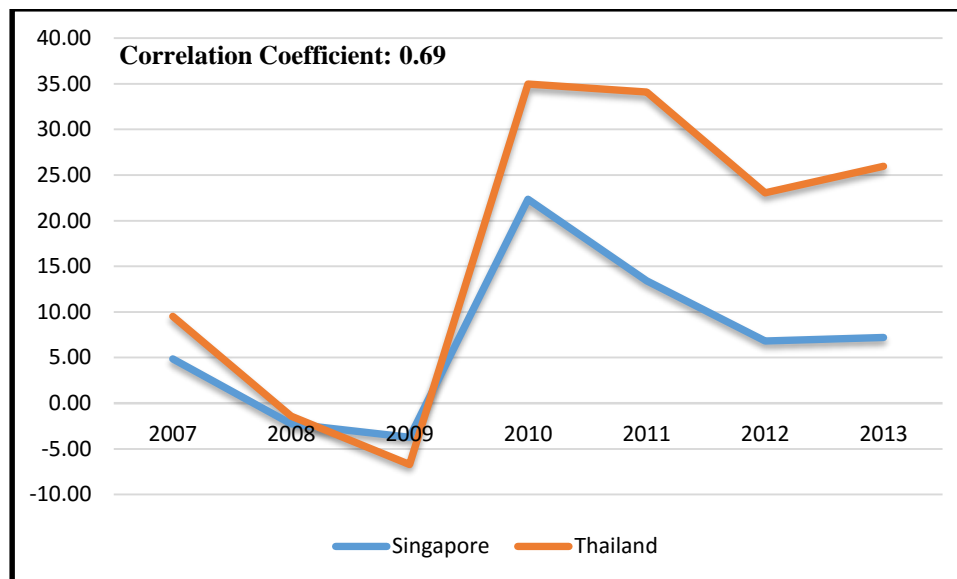
Note. Source: World Bank.

Figure 1. Growth of visitor arrivals in Singapore and Thailand.

In this light, the paper is interested in empirically understanding the causal factors that drive the growth of the tourism industry. Specifically, the paper attempts to provide an empirical explanation for the sources of international tourist arrivals in Thailand and Singapore. To do this, the paper employs a novel empirical approach: the Geweke causality analysis, which helps us understand and measure the linear dependence and feedback between multiple time series variables. To that effect, we performed both a bi-variate as well as multi-variate causality analysis. The unidirectional causality analysis that is popularly employed in the literature does not investigate the degree of dependence or the extent of various kinds of feedback between different time series variables (Calderón & Liu, 2003). However, the method suggested by Geweke (1982) overcomes this problem and helps measure the linear dependence and feedback between multiple time series variables. In essence, the linear dependence is defined as "the sum of the measure of linear feedback from the first series to the second, linear feedback from the second to the first, and instantaneous linear feedback" (Geweke, 1982). The direction of causality and the interplay of the variables can be examined in a more detailed manner with a reduced form quantitative framework under the Geweke causality analysis.[1]

The next section provides a brief background of the importance and significance of the travel and tourism industry in Thailand and Singapore along with an overview of the related literature which form the basis for developing empirically testable hypotheses. Then, the empirical methodology and data employed in the paper is presented, followed by the discussion of the empirical findings. Finally, the paper concludes with a discussion of the policy implications for Malaysia.

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[1] For a more detailed treatment and discussion of causality analysis, see Geweke (1982) and Granger (1988).

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Background, Literature, and Hypothesis

Background

Tourism is one of the world's largest industries and one of its fastest growing economic sectors in Southeast Asian countries, especially Thailand and Singapore. In many countries, tourism and travel has been promoted as an integral part of the national development strategies for decades (Mazumder, Sultana, & Al-Mamun, 2013).
Given the high degree of regional integration among the Southeast Asian countries in terms of trade and investment, the region on the whole could also benefit from the various inter-linkages and spillover effects from the national strategies that are taken by various countries to boost their domestic tourism and travel industry. With the recent establishment of the Association of Southeast Asian Nations (ASEAN) Economic Community (AEC) in December 2015, it is imperative that countries in the region continue to focus and develop plans to bolster their travel and tourism industry that will distribute the benefits of economic growth to the region.

The importance of tourism to both these economies is widely recognized. As per the statistics produced by the World Travel and Tourism Council (WTTC) in 2013, Thailand was ranked No. 17 out of the 184 countries in the world in terms of the absolute size and no. 35 in terms of relative size measured by contribution of the tourism and travel industry to the country's output in 2013 (WTTC, 2015). On a similar note, Singapore was ranked No. 35 out of the 184 countries in the world in terms of the absolute size and no. 83 in terms of relative size measured by the industry's contribution to the country's output during the same period.

Both the countries have registered impressive growth rates in terms of the direct contribution of their respective travel and tourism industry to the output of these countries. As Figure 2 shows, Singapore's direct contribution of its travel and tourism industry to the country's output has been consistently hovering around 5 percent on average between 2005 and 2013. For Thailand, it is even more significant, with the average contribution around 7.5 percent or so during the same period, with the share peaking at 9 percent or so in 2013, on par with the world average. In 2013, the total contribution (direct and indirect put together) of the tourism and travel industry to the output of Thailand and Singapore were much higher at 20 percent and 10 percent respectively.

In terms of employment, Thailand and Singapore saw the travel and tourism industry generate direct and indirect employment. In 2013, the contribution of the industry to direct employment was around 7 percent and the total contribution to include indirect and ancillary jobs springing from the industry was about 16 percent of total employment, underlining the importance of the industry as a crucial engine and source of growth for the country (WTTC, 2014).

The importance of the tourism industry to both Singapore and Thailand has been a direct consequence of flurry of international tourist arrivals that both countries have seen over the last decade or so, as shown in Figure 3. This has consequently led to a significant rise in tourism receipts both as a share of total exports (Figure 4) and in in absolute terms (Figure 5). Thus, inbound tourism as a service traded across borders has emerged as one of the world's important trading categories, with tourism receipts accounting for as much as 16 percent of the total exports for Thailand and averaged about 12 percent or so between 2006 and 2013. The corresponding figures for Singapore were about 4 percent in 2013 and on average tourism receipts as a share of exports were about 3 percent (Figure 5).[2]

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[2] Visitor exports refer to expenditures by foreign visitors which remains an important and growing share of direct contribution of the travel and tourism industry. The ability of the tourism industry to address current account imbalances of a country is also widely recognized in the literature, and there are a number of studies that examine

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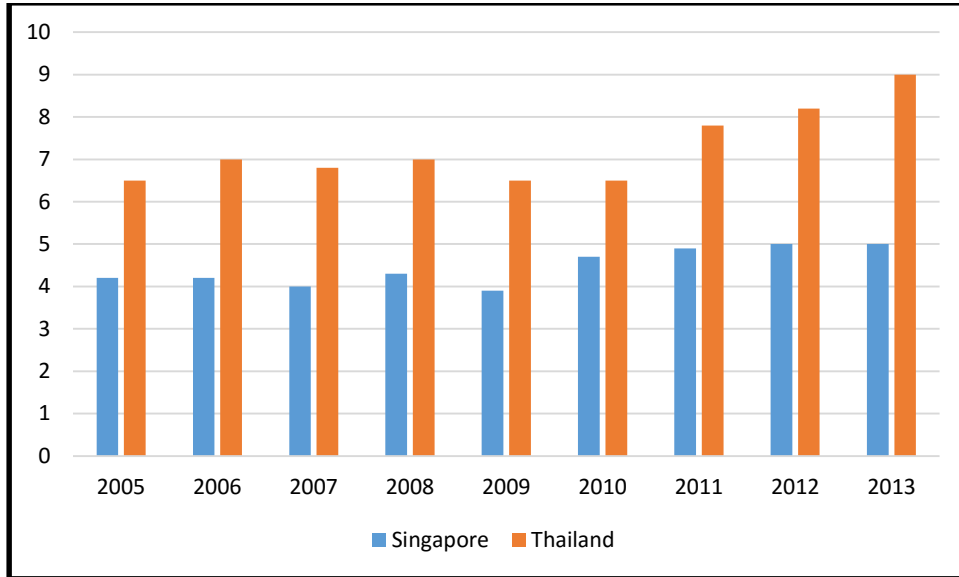
*Note.* Source: WTTC Reports, various years.

Figure 2. Direct contribution of tourism and travel to output (% of GDP).
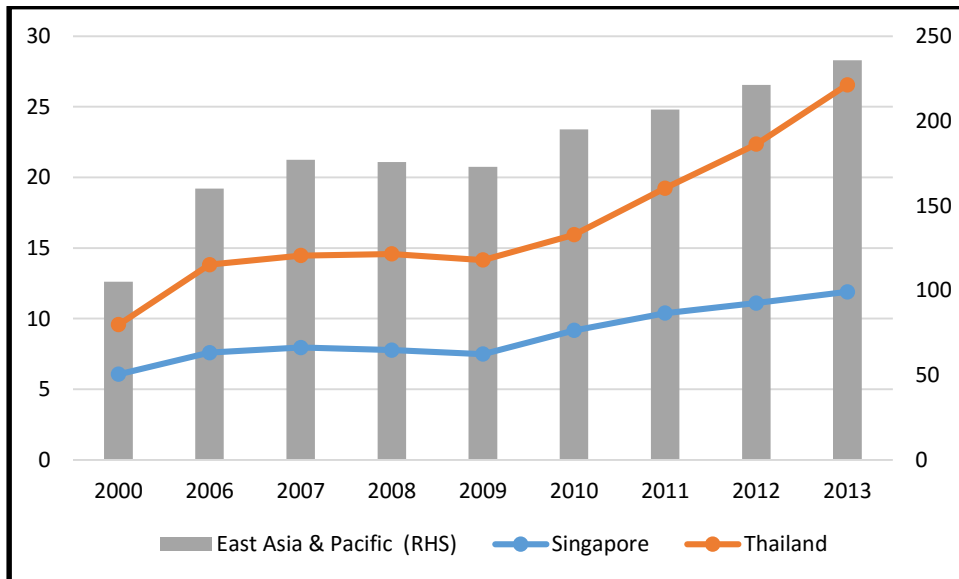
Note. Source: World Bank.

Figure 3. Number of international tourist arrivals (millions).

the importance of tourism through its implications for the balance of payments, especially in developing countries (Malik, Chaudhry, & Sheikh, 2010; Thano, 2015).

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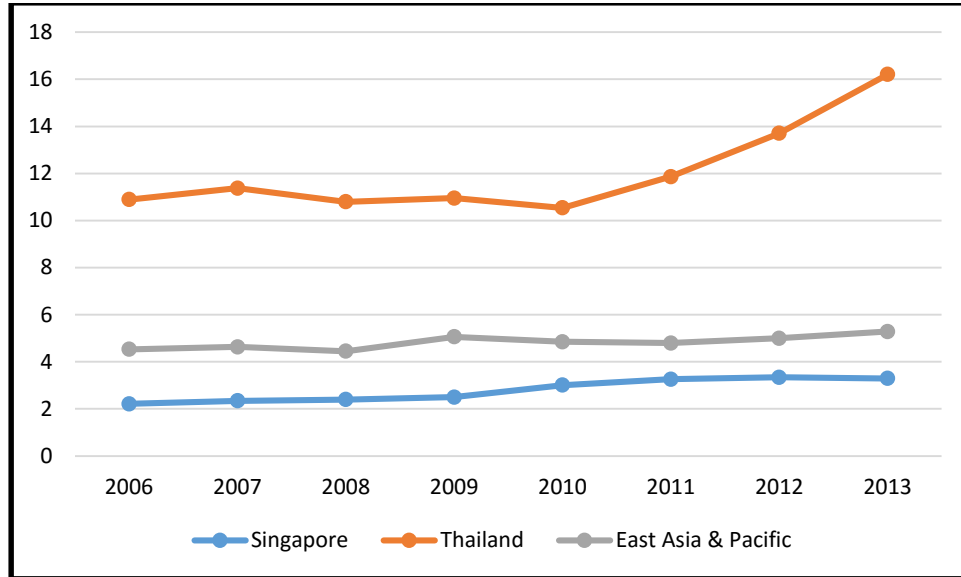
Note. Source: World Bank.

Figure 4. International tourism receipts (% of total exports).
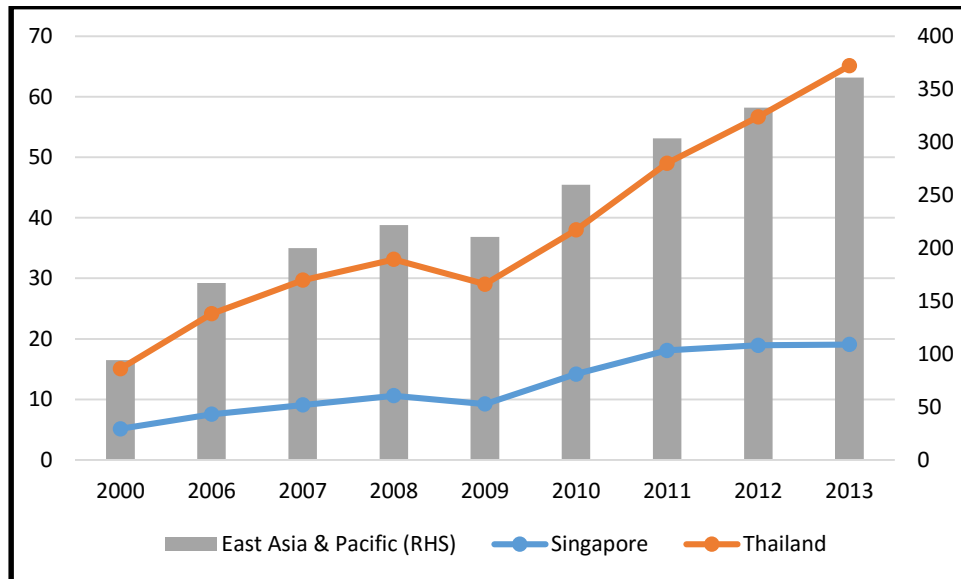
Figure 5. International tourism receipts (current US$ billion).

The development of the domestic tourism and travel industry has always been a prominent feature of the policy agenda of both the countries. The most recent and significant policy initiatives taken by Thailand for instance were the tenth economic and social development plan, covering the period 2007-2011, which included a masterplan to jump start the economy through the active promotion of domestic and international tourism, more specifically to enhance the attractiveness of the country as a preferred destination for international tourists. Yet another policy initiative comes from the national tourism development plan covering the subsequent period of 2012-2016, which

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has an explicit focus of turning Thailand into one of the top five destinations in Asia (Board of Investments Thailand, 2011). In addition, several tourism promotional campaigns have been launched with the most recent one being the plan by the Tourism Authority of Thailand (TAT) to promote the country as a "Quality Leisure Destination through Thainess" which apparently marks a new era for Thai tourism. As noted by the acting Governor of TAT:

> This plan marks the opening of a new chapter for Thai tourism. It is based on the fact that there is more than adequate accessibility to Thailand via excellent air, road and sea connections, as well as smooth facilitation that allows visa-free or visa-on-arrival access for citizens from 68 countries and territories…. we can confidently say that the era of promoting "quantity" is over. The era of promoting "quality" has begun. (TAT, 2015)

Similar initiatives have been taken by Singapore all the way from the 1970s in order to make it a top touristy destination in the region. Considering especially the fact that Singapore is a small city state with relatively few natural resources compared to other countries in the region, the Singapore government duly recognized the potential that the travel and tourism industry can offer to the Singapore economy. The Singapore Tourism Board (STB) has been playing an instrumental role in promoting tourism through a combination of developing "garden attractions and modern hotels" and marketing the city state as "Instant Asia" (Meng, Siriwardana, & Pham, 2013).

Since the 1990s, the STB had elevated its tourism strategies to the next level by coming up with a master-plan which had a plan to accord primacy to tourism in the 21st century. The objectives included multiplying the tourism receipts, doubling visitor arrivals as well as creating significant employment opportunities through the industry. Marking Singapore's 50th anniversary after independence, the Singapore government announced a host of policy initiatives to be undertaken by the STB, with the most prominent one being to ramp up global marketing efforts to boost Singapore's image as a slowing tourism industry. At the annual Tourism Industry Conference in 2015, the Singapore Minister for Trade and Industry Mr. S. Iswaran was quoted saying:

> Outbound travel to the Asia-Pacific is expected to continue to grow, so too intra-Asia travel, as Asian economies and disposable incomes rise. We must be ready to seize our share of this growth and, I would like highlight three ways we can do so: Deepening innovation, boosting promotion and marketing and enhancing capabilities. (Channel News Asia, 2015).

It is clear from the foregoing discussion that both Thailand and Singapore, having well recognized the significance of the contribution of the tourism and travel industry to their respective economies, are putting in place a host of policy initiatives to boost the industry.

Literature and Hypotheses

Most of the related literature explaining the economic significance of the T&T industry examines its potential impact on poverty alleviation, especially in emerging and developing countries. For instance, a comprehensive survey study by the Overseas Development Institute (ODI, 2007) offers a useful conceptual framework to illustrate this link between tourism and poverty alleviation. As noted by ODI (2007), there are three major "pathways"— "direct", "indirect", and "dynamic"—through which tourism can impact poverty reduction.

The direct effects pertain to the incomes that are generated from tourism jobs. The indirect channel relates to the "tourism value chain" where the earnings are generated from allied sectors such as food or transportation industries. Studies suggest that inter-sectoral impacts are substantial and make up about 60 to 70 percent of earnings in the

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industry in developing economies, in addition to the direct effects of tourism (Ashley, Brine, Lehr, & Wilde, 2007). Finally, the dynamic channel spans a wide spectrum as the development of the tourism industry in an economy can enhance the livelihoods of local households, improve the business environment for small enterprises and also ease the infrastructural bottlenecks in an economy, all of which can contribute to poverty reduction through growth (Gopalan, 2013).

There is also a related and extensive literature dating back to the 1990s which has investigated the determinants of tourism demand (see Tan, Gopalan, & Ye (2016) and the references cited within for a more comprehensive discussion of the related literature). The literature points out that the specific variables that have been identified as plausible determinants of tourism demand in any country are real per capita income of the host countries, the (effective) exchange rate, and relative prices prevailing in the host country as well as the quality of tourism infrastructure. It is interesting how there is a clear convergence of the choice of explanatory variables and the results in various country studies trying to investigate the drivers of tourism demand are quite similar.

In a more recent paper, Culiuc (2014) estimated the impact of both supply and demand side determinants of tourism to find that tourism flows respond strongly to changes in the destination country's real exchange rate. The paper also finds that tourism in smaller island countries is less sensitive to changes in the country's real exchange rate, although more sensitive to the quality of infrastructure and connectivity, specifically the introduction and removal of direct flights.

Beyond economics, tourism policy that is designed to market the distinctiveness of local traditions and culture can pave the way for better cultural exchanges between countries which can foster bilateral relations between countries. The literature also points out that, since tourism by its very nature involves and requires inter-country cooperation on many fronts, tourism policy assumes significance in order to shaping a country's engagement with the rest of the world (Prideaux, 2005).

The foregoing discussion leaves us with a broad idea about the variables highlighted in the literature as determinants of tourism demand. However, we go beyond just the related literature and also complement it with the thrust of the various national policy initiatives the governments of Singapore and Thailand have taken in order to identify the growth drivers of the travel and tourism industry. To that end, we empirically try to understand the casual factors that affect the growth of travel and tourism industry in Thailand and Singapore, moving forward. We do this by employing a novel empirical methodology—the Geweke causality analysis—to specifically analyze what factors, ranging from economic to infrastructure to environmental indicators, have a significant causal impact on the growth of the industry.

This paper sets international tourism arrivals as the dependent variable which has been identified by the relevant literature as one of the most appropriate for analyzing the industry. The following hypotheses will be tested: government policy, increased purchasing power for international tourists, improvements in the environment and infrastructure, and safety and security measures are the causal factors driving the growth of international tourist arrivals into Singapore and Thailand.

The independent and control variables that we propose to include in the model can be divided into several categories. First, government policy, which includes government expenditure as well as capital investments on the travel and tourism industry. Second, purchasing power indicators specifically refer to the prevailing cost dynamics in the countries by focusing on the consumer price index (CPI). Third, environmental and infrastructure indicators, which include airport facilities, air quality, and internet users. Fourth, safety and security measures, which include

public security and safety, and religious unrest indicators. In the next section we discuss the methodology employed and the data sources for the variables used in the paper.

Methodology and Data

This section discusses the methodology employed in the paper. We utilized a stepwise regression in the selection of the "best" set of explanatory variables before we identify the variables that need to be tested for causal relationships.

As the first step, the stepwise regression (forward selection) helps us choose the "best" set of explanatory variables by introducing one explanatory variable one at a time. The decision to keep or drop a variable will be based on their contribution to the variance due to regression, based on the F test (Gujarati, 2004).

Further to this, we also employ a factor analysis in the construction of a policy environment comprising several plausible independent variables that could possess significant causal power in explaining the growth of tourist arrivals. Factor analysis consists of an "array of structure-analyzing procedures used to identify the interrelationships among a large set of observed variables and then, through data reduction, to group a smaller set of these variables into dimensions or *factors* that have common characteristics" (Pett, Lackey, & Sullivan, 2003, p. 4). In this paper we adopt a principle component analysis method for factor analysis.

Once the variables are identified, we employ the Geweke causality method to assess the causal factors determining the growth of the tourism industry in Thailand and Singapore. Geweke causality analysis is used as a tool to identify causal relationships in the field of economics and neuroscience. Some recent and prominent applications of Geweke causality to macroeconomic issues include Tan and Cheng (1995), Calderón and Liu (2003) and Aizenman and Noy (2006). While Tan and Cheng (1995) employed Geweke's approach to examine the causal nexus of money, output and prices in Malaysia, Calderón and Liu (2003) explored the direction of causality between financial development and ecnomic growth. Aizenman and Noy (2006) investigated the two-way linkages between foreign direct investment (FDI) and trade.

The causality and linear feedback between two linear systems were defined in Granger (1963; 1969) and Sims (1972) provides complementary tests for the existence of unidirectional causality. Although the determinants of single economic variable are likely to be multidimensional, most applications found in the literature are focused on the bivariate cases. Geweke (1982) developed the concept further by including the instantaneous (two-way) linear feedback between multiple time series, i.e., $F_{X,Y} = F_{X \to Y} + F_{Y \to X} + F_{X \cdot Y}$, which indicates that the measure of linear dependence, $F_{X,Y}$ is the sum of the measure of linear feedback from the first series to the second, $F_{X \to Y}$, linear feedback from the second to the first, $F_{Y \to X}$ and instantaneous linear feedback, $F_{X \cdot Y}$. The measures are non-negative, and zero only when feedback (causality) of the relevant type is absent.

The multivariate causality test proposed by Geweke (1982) is a test between two vectors of the variables. The equivalence of linear dependence measures as proved in one of the theorems in Geweke (1982) provides us with an elegant way to conduct the multivariate test, which is as convenient as bivariate tests. Like Granger (1969), Sims (1972) and Geweke (1982), we focus on wide-sense stationary and purely nondeterministic time series $X = \{x_t, t\ real\}$. By wide-sense stationary, we infer that the mean of x_t exists and is independent of t, and for all t and s $cov(x_t, x_{t+s})$ exists and depends on s but not on t. By purely nondeterministic, it presumes that the correlation of x_{t+p} and x_t vanishes as p increases.

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The idea of causality between multiple time series X and Y can be summarized as follows:

$$F_{X,Y} = F_{X \to Y} + F_{Y \to X} + F_{X \cdot Y} \qquad (1.1)$$

A non-deterministic and stationary multiple time series can be considered as follows:

$$\mathbf{Z}_t = \sum_{s=1}^{\infty} \mathbf{B_S Z}_{t-s} + \boldsymbol{\varepsilon}_t \qquad (1.2)$$

where ε_t is white noise and $\mathbf{z}_t$ can be partitioned into $k \times 1$ and $l \times 1$ subvectors X_t and Y_t.

Geweke (1982) showed a canonical form for the wide sense stationary time series $Z_t = (X_t, Y_t)$ is of the form:

$$x_t = \sum_{s=1}^{\infty} E_{1s} x_{t-s} + u_{1t} \qquad var(u_{1t}) = \Sigma_1 \qquad (1.3)$$

$$x_t = \sum_{s=1}^{\infty} E_{2s} x_{t-s} + \sum_{s=1}^{\infty} F_{2s} y_{t-s} + u_{2t} \qquad var(u_{2t}) = \Sigma_2 \qquad (1.4)$$

$$x_t = \sum_{s=1}^{\infty} E_{3s} x_{t-s} + \sum_{s=0}^{\infty} F_{3s} y_{t-s} + u_{3t} \qquad var(u_{3t}) = \Sigma_3 \qquad (1.5)$$

$$x_t = \sum_{s=1}^{\infty} E_{4s} x_{t-s} + \sum_{s=-\infty}^{\infty} F_{4s} y_{t-s} + u_{4t} \qquad var(u_{4t}) = \Sigma_4 \qquad (1.6)$$

$$y_t = \sum_{s=1}^{\infty} G_{1s} y_{t-s} + v_{1t} \qquad var(v_{1t}) = T_1 \qquad (1.7)$$

$$y_t = \sum_{s=1}^{\infty} G_{2s} y_{t-s} + \sum_{s=1}^{\infty} H_{2s} x_{t-s} + v_{2t} \qquad var(v_{2t}) = T_2 \qquad (1.8)$$

$$y_t = \sum_{s=1}^{\infty} G_{3s} y_{t-s} + \sum_{s=0}^{\infty} H_{3s} x_{t-s} + v_{3t} \qquad var(v_{3t}) = T_3 \qquad (1.9)$$

$$y_t = \sum_{s=1}^{\infty} G_{4s} y_{t-s} + \sum_{s=-\infty}^{\infty} H_{4s} x_{t-s} + v_{4t} \qquad var(v_{4t}) = T_4 \qquad (1.10)$$

Geweke (1982) defined the measure of linear feedback from y to x as:

$$F_{Y \to X} = \ln(|\boldsymbol{\Sigma}_1| / |\boldsymbol{\Sigma}_2|) \qquad (1.11)$$

The measure $F_{Y \to X}$ is always non-negative and takes the value of zero only if the linear feedback running from y to x is absent. Symmetrically, the measure of linear feedback from x to y is:

$$F_{X \to Y} = \ln(|\mathbf{T}_1| / |\mathbf{T}_2|) \qquad (1.12)$$

and the measure of instantaneous feedback is:

$$F_{X \cdot Y} = \ln(|\mathbf{T}_1| * |\boldsymbol{\Sigma}_2|)/|Y|) \qquad (1.13)$$

where:

$$\Upsilon = \text{var} \begin{pmatrix} u_{2t} \\ v_{2t} \end{pmatrix} = \begin{bmatrix} \Sigma_2 & C \\ C' & T_2 \end{bmatrix}.$$

We can decompose the measure of linear dependence between any two groups of time series X and Y, $F_{X,Y}$, as the sum of the measure of linear feedback from the X to Y, $F_{X \to Y}$, linear feedback from the Y to X, $F_{X \to Y}$, and instantaneous linear feedback between the two series, $F_{X \cdot Y}$, as shown in equation (1.1). Geweke (1982) also proved that the following set of equations are equivalent:

$$F_{X,Y} = \ln(|\mathbf{\Sigma}_1|/|\mathbf{\Sigma}_4|) = \ln(|\mathbf{T}_1|/|\mathbf{T}_2|) \tag{1.14}$$

$$F_{X \to Y} = \ln(|\mathbf{\Sigma}_3|/|\mathbf{\Sigma}_4|) = \ln(|\mathbf{T}_1|/|\mathbf{T}_2|) \tag{1.15}$$

$$F_{Y \to X} = \ln(|\mathbf{\Sigma}_1|/|\mathbf{\Sigma}_2|) = \ln(|\mathbf{T}_3|/|\mathbf{T}_4|) F_{X \cdot Y} = \ln(|\mathbf{\Sigma}_2|/|\mathbf{\Sigma}_3|) = \ln(|\mathbf{T}_2|/|\mathbf{T}_3|) \tag{1.16}$$

Data Selection and Sources

The dependent variable we use is the number of international tourist arrivals that have been recognized as the best proxy capturing the growth of tourism industry in a country. The data comes from The World Bank database and captures the total amount of international inbound visitors into Singapore and Thailand between 2000 and 2012.

As far as the independent variables are concerned, we relied on the stepwise regression and a factor analysis approach to identify the appropriate variables for causality testing for both countries. From a master set of independent variables comprising several macroeconomic and institutional variables, we find that only two variables emerge to be significant for Thailand, while we have three in the case of Singapore. However, we conduct a factor analysis as well to construct four different environments capturing the various dimensions of the economy that could affect the growth of tourism in these two countries and assess their relevance in causally explaining the tourism industry's growth. In what follows, we will explain the master set of independent variables that we have considered for our study, although the final choices of the variables used for Geweke causality analysis will be a function of the results from the stepwise regressions.

For both Thailand and Singapore, we used the prevailing inflation levels in the economies, proxied by the consumer price index, as one of the key determinants of growth of tourism industry. The consumer price index data was collected from The World Bank's data set and the indicator describes the changes in the cost to the average consumer of purchasing a specific basket of goods and services on a yearly basis.

As far as the other independent variables are concerned, we examine broadly a set of explanatory factors capturing the government and institutional environment. We consider several relevant measures such as government expenditures on tourism as a share of GDP and the capital investments on tourism as a percentage of GDP, which were collected from the World Travel and Tourism Council (WTTC). The government expenditures on tourism captures the spending of the government on travel and tourism industry related services linked to the tourists, expressed as a percentage share of total GDP. Capital investments on tourism include spending by all sectors involved in the tourism industry (WTTC, 2014).

In addition to these variables, we also tested the relevance of several other variables capturing environment and infrastructure such as airport facilities, air quality and internet users. The explanatory variable on airport facilities was obtained from the World Economic Forum's Global Competitiveness Index's survey data which asked the respondents to rate the quality of the country's air transportation infrastructure with 1: extremely underdeveloped, and 7: extensive and efficient by international standards and was utilized to examine the quality of travel infrastructure. The data on air quality was obtained from the Global Market Information Database and examines the amount of fine particulates, micrograms per cubic meter, that are in the air which are capable of causing health damage. The other relevant infrastructure environment captures the amount of Internet users, measuring individuals with access to the Internet per 100 people, and it was collected from the World Bank's data set.

Finally, we also emphasize the importance of a volatile and unstable security environment in understanding the growth in tourist arrivals. As we discussed earlier, this issue has been a major concern for Thailand and given that the fortunes of Thailand and Singapore are tied together when it comes to political and security related instability affecting their respective tourism industry, we use the public security and safety and religious unrest as broad proxies compiled from the WEF's Global Competitiveness Index survey data to represent the security related explanatory variables. The public safety and security indicator is a composite of two survey questions combined to assess the state of security and safety in the country; the first question asked to what extent does organized crime imposes costs on businesses in the country with 1: to a great extent and 7: not at all, and the second question asked to what extent can police services be relied upon to enforce law and order with 1: cannot be relied upon and 7: can be completely relied upon (World Economic Forum, 2014). The indicator religious unrest asked the respondents to what extent does the threat of terrorism impose costs on businesses in the country with 1: to a great extent, and 7: not at all (World Economic Forum, 2014).

All variables used in empirical estimations were subjected to stationary tests and those that were found to have unit roots were transformed to a stationary series before using it in the causality analysis. The sample of our study spans from 2000 to 2012, and due to limited observations for the period of 2000–2012, we converted the yearly data into quarterly data using quadratic-sum/average method.

Empirical Results

Geweke Causality Analysis for Thailand

As discussed in the previous section, we employed a Geweke causality analysis in this paper to identify the causal determinants of the growth of tourism and travel in Thailand and Singapore. This section will furnish the results of the Geweke analysis in Thailand.

In order to select the "best" set of explanatory variables among the nine variables (Table 1), we adopted a stepwise forward selection. As Table 2 shows, among the nine aforementioned candidates, only consumer price index and religious unrest are the two variables that turn out to be the most significant variables used for Geweke analysis.

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Table 1

Master Set of Variables Considered for Empirical Analysis

Environment	Indicator
Environmental and infrastructure environment	Airport facilities; air quality; internet users
Purchasing power environment	Consumer price index
Government policy environment	Government expenditure on tourism (% of GDP); Capital investment on tourism (% of GDP)
Safety and security environment	Public security and safety; religious unrest

Table 2

Summary of Linear Stepwise Regression Analysis on Tourism Development in Thailand

Dependent variable: International tourism arrials	$y_i = \partial_i + \sum_{k=1}^{K} \beta_k x_{ik} + \epsilon_i$			Number of obs = 51 F=19.71 Prob > F = 0.0000 Adjusted R^2 = 0.4280
Independent variables	β	Standard error	t statistics	p-value
CPI	81656.53***	19811	4.12	0.000
Religious unrest	-702575.7***	131989.1	-5.32	0.000
Constant	11890.11	16561.69	0.72	0.476

Note. *** Represents the 1% level of significance.

Table 3 provides the first set of results for bi-directional causality for Thailand. For the subsequent Geweke causality tables, figures of $F_{x,y}$ may not be equal to the sum of figures of $F_{x \to y}$, $F_{y \to x}$ and $F_{x \cdot y}$ due to round-up. As can be inferred from the bidirectional causality results we do not find any significant unidirectional association between international tourist arrivals and consumer price index on either direction. However, we find that there is an instantaneous causal relationship between the two variables that is significant at the 5 percent level, which cannot be ignored. Further, it is useful to note that this instantaneous causation does not translate into total causality between the two variables, in either direction. Considering the bidirectional causality results between international tourist arrivals and religious unrest, we find that the causality again is bidirectional, although the association between the dependent and explanatory variable at the 1 percent level of significance is being driven by instantaneous feedback.

Table 3

Estimated Measures of Bidirectional Feedbacks between International Tourism Arrivals (ITA), Consumer Price Index (CPI), and Religious Unrest (RU) for Thailand, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	y	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
ITA	CPI	0.0886 (0.2268)	0.0019 (0.7619)	0.0008 (0.8450)	0.0860** (0.0401)
CPI	ITA	0.0936 (0.2047)	0.0002 (0.9242)	0.0075 (0.5457)	0.0860** (0.0401)

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Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
ITA	RU	0.8041*** (0.0000)	0.0008 (0.8413)	0.0505 (0.1156)	0.7528*** (0.0000)
RU	ITA	0.7774*** (0.0000)	0.0155 (0.3830)	0.0091 (0.5049)	0.7528*** (0.0000)

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

Table 4 reports the multi-directional causality between international tourist arrivals on the *X* vector which comprises consumer price index and religious unrest. The results are consistent with what we found earlier in the bilateral case, and there is a strong overall causal relationship between the vector of explanatory variables and tourism growth, although the feedback is instantaneous and ($F_{x \cdot y}$) accounts for almost all the variation in total multi-directional linear dependence. These results indicate that while consumer price index and social stability in Thailand could simultaneously influence international tourism arrivals, the direction of causality individually is difficult to ascertain from the results.

Table 4
Estimated Measures of Multi-Directional Feedbacks between ITA, CPI, and RU for Thailand, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	*y*	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
	CPI				
ITA		1.6695*** (0.0000)	0.0027 (0.9355)	0.0581 (0.2410)	1.6087*** (0.0000)
	RU				

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

The final bit of analysis for Thailand is to examine the bi-directional and multi-dimensional causality of international tourist arrivals with the various explanatory variables lumped into factors through a principle component analysis. We construct different environments which proxy the different determinants of tourism. They can be grouped into environmental and infrastructure; purchasing power; government policy; and safety and security as mentioned earlier. The intuition is to tease out the causal relationships that could exist between these set of variables and tourism growth.

Table 5 furnishes the estimated bidirectional feedbacks between international tourism arrivals and the four environments mentioned above. Consistent with the bidirectional and multi-directional results we found earlier, we find only a strong instantaneous association between the different variables. With the exception of the total causality for international tourist arrivals and environment and infrastructure environment, almost every other environment has a strong and statistically significant relationship with international tourist arrivals. However, as noted before, the

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direction of causality cannot be ascertained because we find only a simultaneous or instantaneous feedback. The multi-dimensional counterpart of the same set of regressions is shown in Table 6 and we find that the results broadly concur with the results shown in Table 5. We find evidence only for an instantaneous feedback.

Table 5

Estimated Measures of Bidirectional Feedbacks between ITA, Purchasing Power Environment (PPE), Government Policy Environment (GPE), Safety and Security Environment (SSE), and Environmental and Infrastructure Environment (EIE) for Thailand, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	y	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
ITA	PPE	0.0962 (0.1940)	0.0000 (0.9704)	0.0013 (0.7997)	0.0949** (0.0311)
PPE	ITA	0.1034 (0.1670)	0.0021 (0.7501)	0.0065 (0.5738)	0.0949** (0.0311)
ITA	GPE	0.1106 (0.1437)	0.0009 (0.8381)	0.0020 (0.7520)	0.1077** (0.0216)
GPE	ITA	0.0594 (0.1036)	0.0002 (0.9131)	0.0004 (0.3471)	0.0587** (0.0216)
ITA	SSE	0.6568*** (0.0000)	0.0013 (0.7985)	0.0466 (0.1308)	0.6089*** (0.0000)
SSE	ITA	0.6358*** (0.0000)	0.0155 (0.3840)	0.0115 (0.4528)	0.6089*** (0.0000)
ITA	EIE	0.1238 (0.1085)	0.0292 (0.2319)	0.0054 (0.6085)	0.0893** (0.0365)
EIE	ITA	0.1304* (0.0942)	0.0061 (0.5837)	0.0350 (0.1904)	0.0893** (0.0365)

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

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Table 6

Estimated Measures of Multi-Directional Feedbacks between ITA, PPE, GPE, SSE, and EIE for Thailand, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x\to y} + F_{y\to x} + F_{x\cdot y})$			
x	y	$F_{x,y}$	$F_{x\to y}$	$F_{y\to x}$	$F_{x\cdot y}$
	PPE				
	GPE				
ITA		1.4171***	0.0282	0.0865	1.3024***
	SSE	(0.0000)	(0.8477)	(0.3744)	(0.0000)
	EIE				

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

In summary, the empirical results point out a couple of interesting results. One, we do not find an explicit uni-directional feedback in either direction for the variables considered. Two, however, there is a joint or simultaneous causation that can be observed between inflation and tourist arrivals as well as between religious unrest and tourism growth. These results point out the need for the policy makers to be sensitive to the macroeconomic shocks as well as domestic political conditions which could adversely affect tourism growth that in turn is likely to have a spillover effect on overall economic growth.

Geweke Causality Analysis for Singapore

We followed a similar template for Singapore, as we did for Thailand, and tried and ascertained the direction of causality between the concerned variables. One notable exception from the Thailand results is that, using our stepwise forward selection, we find more relevant variables to be included in our causality analysis. Specifically, we find that government expenditure on tourism, the capital investments on tourism, consumer price index, airport facilities as well as the indicator capturing religious unrest appear to become the most significant variables to be used for Geweke causality analysis (Table 7).

Table 7

Summary of Linear Stepwise Regression Analysis on Tourism Development in Singapore

Dependent Variable: International tourism arrivals		$y_i = \partial_i + \sum_{k=1}^{K} \beta_k x_{ik} + \epsilon_i$		Number of obs = 51 $F = 44.54$ Prob > F = 0.0000 Adjusted $R^2 = 0.8132$
Independent variables	β	Standard error	t statistics	*p*-value
Government expenditure on tourism (% of GDP)	3253069.00***	358715.80	9.07	0.000
Capital investment on tourism (% of GDP)	-50283.18***	10181.20	-4.94	0.000
CPI	20341.80***	7154.60	2.84	0.007
Airport facilities	-351607.80**	170567.20	-2.06	0.045
Religious unrest	-46283.62**	22789.90	-2.03	0.048

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Constant	8506.50	6361.20	1.34	0.188

Note. ** and *** represent the 5% and 1% level of significance, respectively.

Table 8 starts with bidirectional causality results. With the exception of a weak unidirectional causality between international tourist arrivals and airport facilities, there is no other set of variables that exhibit strong causality in either direction. However, there are two interesting results that come out of this analysis. One, consistent with the results for Thailand, we find that there is evidence only for an instantaneous feedback between the variables and no evidence whatsoever for unidirectional causal associations individually. Two, however, unlike Thailand, the variables for which we find a significant instantaneous feedback, are exactly those variables that were not part of the Thailand estimation, namely, we find that inflation and religious unrest to be insignificant whereas all the other variables were significant in the case of Singapore.

Table 8

Estimated Measures of Bidirectional Feedbacks between ITA, Government Expenditure on Tourism (% of GDP) (GET), and Capital Investment on Tourism (% of GDP) (CI), CPI, Airport Facilities (AF), and RU for Singapore, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	y	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
ITA	GET	1.2279*** (0.0000)	0.0010 (0.8274)	0.0025 (0.7270)	1.2245*** (0.0000)
GET	ITA	1.2553*** (0.0000)	0.0002 (0.9185)	0.0306 (0.2209)	1.2245*** (0.0000)
ITA	CI	0.4247*** (0.0001)	0.0014 (0.7950)	0.0035 (0.6804)	0.4198*** (0.0000)
CI	ITA	0.4216*** (0.0001)	0.0006 (0.8674)	0.0013 (0.8041)	0.4198*** (0.0000)
ITA	CPI	0.0503 (0.4818)	0.0010 (0.8259)	0.0002 (0.9295)	0.0491 (0.1207)
CPI	ITA	0.0551 (0.4406)	0.0001 (0.9675)	0.0059 (0.5915)	0.0491 (0.1207)
ITA	AF	0.8076*** (0.0000)	0.0038 (0.6663)	0.0662* (0.0718)	0.7377*** (0.0000)
AF	ITA	0.7642*** (0.0000)	0.0212 (0.3078)	0.0053 (0.6088)	0.7377*** (0.0000)

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ITA	RU	0.0257 (0.7384)	0.0002 (0.9222)	0.0020 (0.7558)	0.0236 (0.2825)
RU	ITA	0.0252 (0.7447)	0.0005 (0.8812)	0.0012 (0.8103)	0.0236 (0.2825)

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

Table 9 shows the multi-directional causality results between international tourist arrivals on the *X* vector and the *Y* vector of variables comprising government expenditures on tourism, consumer price index, capital investments on tourism, airport facilities and religious unrest. We find that that there is strong causality between *X* and *Y* ($F_{x,y}$) at the 1 percent level of significance. Although there is no significant linear feedback running from *X* to *Y* or *Y* to *X* ($F_{x \to y}$; $F_{y \to x}$), the instantaneous association between *X* and *Y* ($F_{x \cdot y}$) is strongly significant at 1 percent level and contributes 96 percent of total multi-directional linear dependence. These results indicate that the government policies on tourism, inflation rates, airport construction and social stability in Singapore could effectively and simultaneously affect international tourism arrivals.

Table 9
Estimated Measures of Multi-Directional Feedbacks between ITA, GE (% of GDP), CI (% of GDP), CPI, AF, and RU for Singapore, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	*y*	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
	GET				
	CI				
ITA	CPI	2.4647*** (0.0000)	0.0063 (0.9975)	0.0923 (0.4768)	2.3661*** (0.0000)
	AF				
	RU				

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

Table 10
Estimated Measures of Bidirectional Feedbacks between ITA), Purchasing Power Environment (PPE), GPE, Environmental and Infrastructure Environment (EIE) and SSE for Singapore, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	*y*	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
ITA	PPE	0.0723	0.0015	0.0085	0.0623*

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		(0.3150)	(0.7874)	(0.5182)	(0.0805)
PPE	ITA	0.0761	0.0001	0.0136	0.0623*
		(0.2925)	(0.9486)	(0.4138)	(0.0805)
ITA	GPE	1.6515***	0.0053	0.0102	1.6360***
		(0.0000)	(0.6115)	(0.4786)	(0.0000)
GPE	ITA	1.6679***	0.0001	0.0318	1.6360***
		(0.0000)	(0.9786)	(0.2117)	(0.0000)
ITA	EIE	0.5322***	0.0093	0.0526	0.4703***
		(0.0000)	(0.5000)	(0.1084)	(0.0000)
EIE	ITA	0.5132***	0.0200	0.0229	0.4703***
		(0.0000)	(0.3220)	(0.2895)	(0.0000)
ITA	SSE	0.2283**	0.0130	0.1985***	0.0168
		(0.0108)	(0.4251)	(0.0018)	(0.3646)
SSE	ITA	0.1155	0.0543	0.0444	0.0168
		(0.1294)	(0.1029)	(0.1400)	(0.3646)

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

Following what we did for Thailand, we next consider the causality results for the different environments and tourism growth. It is important to highlight that the environment capturing environment and infrastructure as well as government policies have a strong instantaneous causal feedback with growth in international tourist arrivals, while there is no significant association between the other two environments comprising of purchasing power and security (Table 10).

The multi-directional counterpart is shown in Table 11 and the results appear to be consistent with what we discussed earlier in that the there is a strong and significant linear feedback running from Y to X ($F_{y \rightarrow x}$), which perhaps is being driven by the significance of the government policy and environmental and infrastructure environment. The instantaneous association ($F_{x \cdot y}$) is also highly significant at the 1 percent level, contributing to over 90 percent of the total multi-directional linear dependence.

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Table 11

Estimated Measures of Multi-Directional Feedbacks between ITA, PPE, GPE, EIE, and SSE for Singapore, 2000-2012[ab]

Economic aggregates		$H_0(F_{x,y} = F_{x \to y} + F_{y \to x} + F_{x \cdot y})$			
x	y	$F_{x,y}$	$F_{x \to y}$	$F_{y \to x}$	$F_{x \cdot y}$
	PPE				
	GPE	2.6134***	0.0263	0.2300**	2.3571***
ITA		(0.0000)	(0.8634)	(0.0237)	(0.0000)
	EIE				
	SSE				

Note. [a] *, ** and *** denote 10%, 5% and 1% level of significance, respectively. [b] Confidence interval would be provided upon request.

To summarize the results, our causality analysis shows two interesting trends: The first pertains to the consistency with that of Thailand, where we find evidence only for an instantaneous feedback between the explanatory variables considered and international tourist arrival. This implies that there is no unidirectional causal association individually that we could establish. The second conclusion to come out of this analysis is that we find the quality of infrastructure as proxied by airport facilities causes tourism growth, which is consistent with the story of Singapore's investments in its airport infrastructure. Further, we also find that the lists of variables which exhibit significant instantaneous feedback are those that were not significant for Thailand.

Conclusions

Tourism is one of the vibrant economic sectors in Southeast Asian countries, being spurred by the growth of this industry in Thailand and Singapore. These two economies stand out from the rest of Southeast Asia in terms of their significance of domestic tourism and travel industry, as measured by growth in tourist arrivals, the consequent revenues generated, as well as employment opportunities.

These countries have also promoted several national development strategies for decades in these two countries. In this light, the paper identifies the causal determinants of the growth of the travel and tourism industry in Thailand and Singapore, using quarterly data from 2000–2012, under a Geweke causality framework.

The findings of the paper leave us with useful policy insights that could serve as a useful guidance to policymakers to boost the capacity and enhance the quality of the domestic travel and tourism industry in both the countries.

While overall our results are stronger for Singapore than Thailand, we still find that there is a strong linear instantaneous feedback between international tourist arrivals and the different policy environments we chose for the respective countries. For Thailand specifically, we find that religious unrest, capturing an element of domestic instability and turbulence seems to affect international tourist arrivals significantly. This appears to be consistent with what happened to Thailand after 2013, where the political turmoil caused a severe setback to the growth of the tourism industry and also halted the country's economic growth. This is also likely suggestive that the policy makers must pay attention to the economic damage that such instability can bring about to the tourism industry in particular but the economy more generally. In the case of Singapore, we find that international tourist arrivals are driven by

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infrastructural variables covering airport facilities as well as government policy variables such as government expenditures on the tourism industry.

The strong causal relationship we find between these variables is consistent with the national tourism policies of Thailand and Singapore although our causality results are indicative of an instantaneous feedback rather than a strong unidirectional feedback in either direction. The only exception being the weak unidirectional relationship that we find in the case of Singapore where the causality runs from quality of airports to international tourist arrivals, which again stands testimony to the efforts taken by the Singapore government in maintain a world-class airport like the Changi airport. In fact, Changi airport is an example of an aviation hub that has played an instrumental role in the transformation of economy into an important destination by leveraging the tourism-transport policy complementarities.

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