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Impact of tourism on regional economic growth: A global value chain perspective

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IMPACT OF TOURISM ON REGIONAL ECONOMIC GROWTH

A GLOBAL VALUE CHAIN PERSPECTIVE

Anyu Liu

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Impact of Tourism on Regional Economic Growth: A Global Value Chain Perspective

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ABSTRACT

In the globalization era, many products in the tourism industry are imported from other economies; whereas other products may be exported as intermediates to other economies. Researchers have assessed the economic impact of tourism for more than 40 years, but have shed little light on the economic impact on economies in the global value chain. To fill this gap, this analysis used the multiregional input–output table with 35 industries and 63 economies to comprehensively examine the economic contribution of tourism to Thailand as well as to the global economy. Findings suggest that tourism in Thailand generates significant economic impact on output and value added. The industry has stronger intra-spillover and linkage with domestic industries, particularly downstream industries, and weaker connections with industries in other economies in the global supply chain. The multiregional input–output model also reveals that it can measure the export performance of the industry more accurately than the traditional input–output model. Findings generate comprehensive empirical results for destinations and regional organizations to more accurately strategize tourism or regional tourism development plans.

Keywords: multiregional input–output model; global value chain; economic impact; tourism development

JEL codes: R15, Z32

I. INTRODUCTION

International tourism was growing steadily before the COVID-19 pandemic. In Thailand, for example, international visitors increased from 15.9 million in 2010 to 39.9 million in 2019 for an average annual growth rate of 10.7%. Travel and tourism in Thailand—the 8th largest global destination by visitor arrivals and 4th in tourism receipts in 2019 (UN WTO 2020)—contributed to 19.7% of national gross domestic product (GDP) and generated 21.4% of employment (WTTC 2020).

The economic impact of tourism has been a popular topic in the literature since the 1980s (Baster 1980). Research into tourism has adopted various methods, including the input-output (IO) model, the tourism satellite account (TSA), the computable general equilibrium (CGE), and the dynamic stochastic general equilibrium model to measure impact on output, value added, employment, and spillover effects from/to other industries in various destinations and time periods (Liu, Song, and Blake 2018).

In general, tourism researchers believe that tourism development can contribute to a destination's economic growth and improve the income of local residents (Liu, Song, and Blake 2018; Liu and Wu 2019). However, substantial tourism products are imported from other economies, such as wine and facilities in hotels and restaurants in the industry. And many products are exported as intermediates for tourism products, such as food ingredients. Previous studies of the economic impact of tourism focused only on the impact in the destination economy, overlooking the impact of the destination's main downstream and upstream suppliers. Given sustained globalization and increasingly regional collaboration led by organizations such as the Association of Southeast Asian Nations (ASEAN), evaluating the economic impact of tourism across economies and industries is critical and valuable for academics, the tourism industry, and policy makers.

Leontief and Strout (1963) proposed the multiregional IO (MRIO) to integrate multiple national IO tables into one model. MRIO can extend the traditional IO model analysis from the focal economy to economies on the full global value chain (GVC). Although MRIO has been established for more than 5 decades and has widely been adopted in mainstream macroeconomic analysis (Tukker and Dietzenbacher 2013), research has scarcely shed light on MRIO in tourism literature. This paper adopts the MRIO and evaluates the economic impact of tourism development from a more comprehensive perspective. Thailand is showcased to examine not only the economic impact on the domestic economy but also on other economies with intensive international trade connections with Thailand. The MRIO is also used to map the position of Thailand in the tourism GVC and establish a reasonable and accurate assessment of tourism's export performance.

In the remainder of the study, section II briefly reviews key concepts and models in the tourism literature on the evaluation of economic impact. Section III introduces the model and selected indicators. Section IV presents main findings and section V concludes and presents future research direction.

II. LITERATURE REVIEW

A. Input–Output Model in Tourism

The IO model shows interdependencies between industries in a national/regional economy (Chenery 1953, Leontief et al. 1965, Moses 1955). The model is based on the input–output table in national accounting and reveals how much outputs from one industry can be transformed into inputs of other industries. Thus, it evaluates the connections between industries and the contribution of different industries to the economy (Dietzenbacher and Lahr 2004).

The IO model has been adopted to evaluate the economic impact of the tourism industry for more than 4 decades. Baster (1980) integrates visitor expenditure survey data with the classic IO table and estimates income and employment elasticities of visitor expenditure in Scotland. He also reminds future researchers to be cautious with the purchase of imports as it is an economic outflow from the economy (i.e., economic leakage). Ruiz (1985), in another pioneering study, estimates that tourist expenditure in Puerto Rico contributed 5% of GDP and 49,000 jobs in 1980 using the national IO table.

Although these two studies were the first few attempts to adopt the IO model in the tourism literature, Fletcher (1989) is the first to systemically introduce the rationale and method of the IO model into tourism economics.¹ He estimates the tourism income multiplier of 30 worldwide destinations, ranging from 0.19 to 1.96, which means that a 1.00% increase in tourist expenditure will improve the income of residents by 0.19% to 1.96%, respectively.

Although the Fletcher work measures the direct impact of tourism to the economy, it cannot fully capture its total contribution. The indirect effects of the tourism industry refer to the output increase in businesses in other industries caused by the boom of businesses in the tourism industry, whereas the induced effects indicate that the expansion of output in other industries resulting from tourism improved the income of residents (Dietzenbacher and Lahr 2004). Khan, Seng, and Cheong (1990) extend the multiplier analysis from direct multiplier to include indirect and induced multipliers and reveal that the indirect and induced effects accounted for 50% of the total tourism contribution to the economy, using Singapore as the case study.

Meanwhile, Archer and Fletcher (1996) shed light on the role the tourism industry plays in the value chain. Their work reveals that the industry is likely to use outputs of other industries as inputs, because most tourism products are final goods for consumption in the economy. Freeman and Sultan (1997) expand the framework into a multiregional context and propose an MRIO model, which addresses the leakage of imports, improving the accuracy of the assessment of the economic impact of the tourism industry. Kronenberg, Fuchs, and Lexhagen (2018) focus on the fluctuation of the economic impact across time periods.

Overall, these studies have established the solid foundation of the IO model in the tourism literature. Follow-up studies have emerged to apply the IO model in different destinations. For example, Archer (1995) applies the IO model to analyze the economic impact of the tourism industry in Bermuda using the linkage analysis. West (1993) and Frechtling and Horváth (1999) adopt

¹ The details of the IO model are introduced in the next section.

the IO model and multiplier analysis to regions, with Queensland, Australia and Washington, DC, United States as examples, respectively. Lee and Kwon (1995) highlight the indirect effect of the tourism industry on the Republic of Korea's economy. Similar studies also include Atan and Arslanturk (2012) for Turkey; Khoshkhoo, Alizadeh, and Pratt (2017) for Iran; Khanal, Gan, and Becken (2014) for the Lao People's Democratic Republic; Polo and Valle (2008) for the Balearic Islands (Spain); and Surugiu (2009) for Romania.

Researchers make some strong assumptions and limitations in applying the IO model to assess the economic impact of the tourism industry. One of the major challenges of the IO model arises from the assumption of constant input coefficients, which ignores the substitution between production factors and technology improvement. Other limitations include the assumption of the exogenous resident and government consumption and the omission of a price adjustment mechanism (Briassoulis 1991); this paper indicating that the results of IO model should be explained with caution. Johnson and Moore (1993) and Zhou et al. (1997) reveal that the IO model tends to overestimate the economic impact of the tourism industry. Consequently, a few studies have attempted to refine the estimated impact. Wanhill (1994) compares income multipliers estimated by various income indicators, whereas West and Gamage (2001) adopt a nonlinear IO model in Victoria, Australia. Considering that IO tables are published by most economies, the IO model is still widely used in contemporary tourism literature, particularly in environmental impact assessment (e.g., Sun, Cadarso, and Driml 2020) and CGE model estimation (e.g., Li, Liu, and Song 2019).

B. Tourism Satellite Account

The TSA employs top-down, bottom-up, or mixed approaches in measuring direct tourism impact, because no single tourism sector exists in the input-output table/national account. Instead, the sector cuts across different industries. The top-down approach disaggregates the share of tourism activity in economic impact indicators in different industries and reaggregates them, such as the Wales TSA in Jones, Munday, and Roberts (2003). The bottom-up approach estimates tourism's economic impact based on regional tourism consumption and visitor arrivals, such as the Vienna TSA in Austria by Smeral (2010).

The most frequently used national TSA uses the mixed approach. The demand side is estimated by the bottom-up approach and the supply side by the top-down approach. The demand side and supply side are balanced to calculate the portion of tourism-related production in each sector, which is consequently used to estimate the direct tourism impact in the economy (Wu et al. 2019). For example, the TSA extracts tourism-related value added from various industries and sums them up as the tourism value added.

Although Canada is the first economy to have a statistically compiled TSA, Sweden is the first to be featured in the tourism literature. Nordström (1996) calculates tourism consumption expenditures in Sweden using TSAs in 1992 and 1993. Three years later, Meis (1999) summarizes the Canadian TSA experience. Frechtling (1999) systematically introduces the foundation and principles of the TSA compilation, and Frechtling (2010) updates the compilation methodology on the basis of the *Tourism Satellite Account: Recommended Methodological Framework 2008* (UN WTO 2008), a guidance jointly published by the United Nations Statistics Division, the Statistical Office of the European Communities, the Organisation for Economic Co-operation and Development (OECD) and the United Nations World Tourism Organization. Libreros, Massieu, and Meis (2006) investigate TSA practices in different economies, and find that implementation of the TSA varies worldwide because destinations have different definitions of tourism activities.

Tourism researchers are keen to apply the TSA framework to assess the economic impact of the tourism industry. Studies associated with the application of national TSAs include Ahlert (2007) for Germany; Frentz (2018) for Iceland; Heerschap et al. (2005) for the Netherlands; Kenneally and Jakee (2012) for Ireland; and Sharma and Olsen (2005) for Tanzania. Apart from the national TSA, Jones, Munday, and Roberts (2003) introduce the regional TSA into the literature. The application of regional TSA includes Pham, Dwyer, and Spurr (2008) and Smeral (2010, 2015). Jones, Munday, and Roberts (2009) compare the top-down and bottom-up approaches in the regional TSA compilation and conclude that the latter is more accurate but also more expensive.

Smeral (2006) argues that the limitation of the TSA is that it only considers the direct impact. As introduced by Khan, Seng, and Cheong (1990) and Van Truong and Shimizu (2017), the IO model can be used to measure the indirect and induced effects of tourism activities. Thus, Munjal (2013) adopts the multipliers in the IO model to further estimate the indirect and induced effects using the direct economic impact generated from the TSA output. TSA is also adopted in CGE models (e.g., Blake et al. 2001; Dwyer, Forsyth, and Spurr 2007; Jones and Li 2015) and dynamic stochastic general equilibrium models (e.g., Liu, Song, and Blake 2018; Liu and Wu 2019) to comprehensively evaluate the impact of the tourism industry on the destination economy. In addition, the TSA framework is widely adopted to assess the environmental impact of the tourism industry, such as in Ragab and Meis (2016).

C. Global Value Chain

The concept of the GVC, which measures products or services that firms purchase from other companies across different regions as resources to produce their own products or services, is originally from microeconomics (Song, Liu, and Chen 2013). Given the sustained globalization, GVCs have played a more important role than ever in national economies. As a jointly published report by the OECD, the World Trade Organization (WTO) and the World Bank (OECD-WTO-WB 2014) argues, GVCs are critical to global economic growth in the long run through production specialization, technology, and knowledge spillovers and cost-saving strategies. Thus, if GVCs are aggregated to the national level, they can be integrated with national accounting and used to measure linkages and leakages in the economy (Sun 2019).

As reviewed by Song, Liu, and Chen (2013), most GVC studies in the tourism literature focus on the tourism industry only, omitting the macroeconomic impact. Judd (2006) introduces the concept of the global commodity chain and discloses three inputs to the chain, including marketing and image, infrastructure and tourism providers, and service workers. Erkuş-Öztürk and Terhorst (2010) investigate the commodity chain in international tourism between the Netherlands and Turkey. Mitchell (2012) proposes a conceptual framework to investigate the impact of tourism on low-income households in developing economies using the GVC. Micro GVC studies reveal the critical role of the GVC in the development of the tourism industry; however, a more comprehensive picture showing the impact of tourism GVCs on the visitor economy has been overlooked. Sun (2019) is the only study which combines the GVC and IO model in the tourism literature. Her interest is in the impact of leakage on carbon emissions but only focuses on the international tourism of Japan and Taipei, China.

Although the linkage and leakage analysis with the IO model in the tourism field can be traced back 40 years, most studies have focused on the connections across industries. International linkages or leakages are either omitted or considered economies and regions in the GVC as a homogenous market. However, different markets may play various roles in the GVC for a specific destination for different reasons, such as physical distance, accessibility, and tariffs, to name a few. The combination of the GVC and the IO model will extend the linkage and leakage analysis from across industries to economies or

regions, which will measure the economic impact of tourism activities more accurately and reveal the economic contribution of the tourism industry to a cluster of economies or regions in the GVC.

To fill the gap, the MRIO is used to capture flows of tourism products from destination to origin economies, which sheds light on trade in service, particularly tourism in international economics. Multiple supply economies are involved in the GVC in the MRIO model, thereby possibly capturing their diverse contributions to linkage and leakage. The heterogeneous assumption of global suppliers also improves the assessment accuracy of the impact of the tourism industry on the economy.

III. METHODOLOGY AND DATA

A. Multiregional Input-Output Table

Figure 1 presents the structure of a multiregional IO (MRIO) table with N industries and G economies. In MRIO, Z_{ijrs} indicates the input from industry j in economy r to industry i in economy s . In the tourism context, it measures the imports of products from different industries in economy r as inputs to the tourism industry in economy s . y_{rs} is a $n \times 1$ vector that measures the final product produced in economy r and consumed in economy s . X_G and VA_G' are $n \times 1$ vectors, which stand for gross output and value added in economy G , respectively. Similarly, industries and final products are categorized as tourism and non-tourism industries or products to investigate the direct economic impact on the economy, covering both domestic and inbound tourism in the destination. Compared with the national IO table, international trade is disaggregated and allocated across industries and economies; thus, the GVC of interested industries can be captured. Four matrices are defined on the basis of components in Figure 1. The technical coefficient matrix is defined as $A = Z_{rs} \hat{X}_G$, which is a matrix containing gross output per economy-sector in its diagonal. Output $X = AX + Y$, indicates that the output equals to intermediate production plus final demand. The output coefficient and value-added matrices are $O = \hat{X}_G^{-1} Z_{rs}$ and $V = \hat{X}_G VA_G' B = (I - A)^{-1} G = G = (I - O)^{-1}$.

Figure 1: Multiregional Input-Output Table

		Economy 1			...			Economy G						Domestic production
		l ₁₁	...	l _{1n}	l ₁₁	...	l _{1n}	Economy 1	...	Economy G	
Economy 1	l ₁	Z_{ijrs}									y_{rs}			X_G
	...													
	l _{1n}													
...	...													
	...													
	...													
Economy G	l ₁													
	...													
	l _{1n}													
Intermediate input total														
Value added		VA_G												
Domestic production		X_G												

Source: Author.

B. Research Content

This study adopts data from Thailand to illustrate the impact of tourism development on regional economic growth because of its strong tourism performance relative to other economies before the outbreak of coronavirus disease (COVID-19) and its key role in international trade in Southeast Asia. The Thai national IO table adopted in this study was extracted from an MRIO with 63 economies and 35 sectors, developed by the Asian Development Bank. Ideally, tourism industry data should be obtained from the TSA of each destination. However, applying TSA information to the MRIO is difficult as it is composed of a large number of economies whose tourism products and tourism expenditure vary widely. Accordingly, tourism-oriented industries, which are industries with a large portion of output directly used by tourists regardless of the economy, were selected to represent the tourism activities in the economy. The use of tourism-oriented sectors to represent the tourism industry is a common practice in tourism economic literature (e.g., Liu, Song, and Blake 2018; Lin et al. 2020). In this study, data between 2007 and 2019 from hotels and restaurants; air transport; and other community, social, and personal services sectors are selected to represent Thai tourism activities.

C. Key Indicators

This section presents various key indicators used to measure the economic impact of tourism across economies and industries for the case of Thailand.

1. Multipliers

To comprehensively assess the economic impact of tourism development in a destination, this study adopts multipliers on the bases of the MRIO. The appendix² details how these indicators are measured.

Output Multiplier. From the MRIO perspective, the column sum of the tourism industry in B matrix is the national output multiplier in which the sum of blocked diagonal elements is the intraregional output multiplier, and the sum of off-diagonal elements is the interregional output multiplier.

Value-added multiplier. The value-added multiplier includes simple and total multipliers. The simple value-added multiplier refers to the amount of value added in the form of wages and salaries, entrepreneurial income, contribution of capital (consumption of fixed capital), economic profit, and taxes less subsidies on production on a particular industry due to a unit increase in tourism spending. The simple value-added multiplier takes only the direct and indirect effects of tourism on value added. Correspondingly, the total value-added multiplier can measure the sum of the direct, indirect, and induced effects of the tourism industry on value-added. Apart from absolute values, the type I multiplier shows the relative magnitude of total value added from the initial value-added impacts from each unit of spending in sectors. It is simply calculated as the ratio of total value added to the direct value added required per unit of demand. From the MRIO perspective, the value-added multiplier can also be split into intra- and inter-multiplier, respectively. The intra-multiplier focuses on the contribution to the domestic economy and the inter-multiplier on the rest of the world.

² The appendix can be accessed here: <https://www.adb.org/publications/impact-tourism-regional-economic-growth>.

2. Linkage and Leakage

In an effort to determine the degree of interconnection between tourism industry and other local productive sectors as well as non-domestic industries, linkages and leakages are computed.

Linkage. The direct linkages of the tourism industry are measured by matrices used in determining the inputs consumed for the production, which is what the A and O matrices describe. The linkage can also be split into intra- and interregional linkages using the same approach as the output multiplier. Specifically, the backward linkage is the column sum of B matrix; whereas the forward linkage is the row sum of G. Apart from direct linkages, total backward linkage shows how much output would be generated in the economy to supply the increase in tourism production as well as induced production in the entire economy. Meanwhile, total forward linkage shows how much output would be generated in the economy to use the increased output supplied by industries linked to tourism. Using normalized values of the linkages can provide an indication of the relative strength of interindustry linkages. Standardized backward and forward linkages, also called the backward and forward indices, respectively, are calculated by dividing the total backward and forward linkages over the average backward and forward linkages for all industries. For both standardized backward and forward linkages, a value larger than 1 means above average linkage, and a value below 1 means a below average linkage. It would provide indication if an industry is independent of other industries (below average or weaker linkage) or more interconnected with other industries (above average or stronger linkage).

Leakage. The import leakage, which is also called import multiplier, measures the total amount of foreign inputs required for every unit of final demand in tourism. Similar to the other indicators, simple import multiplier only considers the direct and indirect effects, while total import multiplier considers direct, indirect, and induced effects on production. MRIO also sheds light on the supply chain in the import sector. The backward leakage measures the response of non-domestic sectors to the change in the tourism industries' final demand, and the forward leakage captures the extent to which primary inputs from the tourism industry in all non-domestic industries would increase when the tourism industry increases its output.

3. Global Value Chain Indicators

Owing to the nature of the tourism industry, most tourism activities are related to the consumption of final products, such as dining in restaurants and taking a flight. Thus, imports from other economies for tourism and exports to other economies for tourism are more likely to play as intermediates rather than value added in national accounting. To measure the performance of the tourism industry in GVCs, the traditional overall exports and import are not perfect indicators because they include value added imported or exported from other economies or regions.

Backward GVC participation rate. On the basis of the backward linkage, tourism domestic production can be decomposed into domestic production consumed domestically, exported domestic production, and domestic and foreign products in intermediate imports. The backward GVC participation rate is calculated as domestic and foreign products in intermediate imports divided by tourism domestic production, which measures the share of total value added consumed by the tourism industry sourced from GVCs (or sourced from intermediate imports).

Forward GVC participation rate. Based on the forward linkage, the tourism value added can be split into the production of final products for domestic consumption and the production of final direct exports and intermediate exports, respectively. The forward GVC ratio is equal to the intermediate tourism exports divided by the tourism value added, which measures the domestic value added absorbed into GVCs as a share of the industrial production.

The ratio of forward and backward GVC participation rates indicates the position of the tourism industry in the global production network. A higher degree of forward engagement means a more upstream position in the GVC, whereas higher engagement of backward participation indicates a more downstream position.

Traditional and new revealed comparative advantage. Two measures exist for comparative advantage in the literature. The traditional revealed comparative advantage (TRCA) is the share of a destination's tourism gross exports in total destination gross exports divided by tourism gross exports from all economies as a share of world total gross exports. The new revealed comparative advantage (NRCA) stands for the share of a destination's forward-linkage-based measure of direct value added in exports in total direct value added in exports divided by that tourism's total forward-linkage-based direct value added in exports as a share of global value added in exports. Compared with TRCA, NRCA excludes the impact of intermediate exports, which more accurately measures the direct contribution to tourism exports.

IV. FINDINGS AND DISCUSSION

A. Multiplier Analysis

Multipliers, which are commonly used tools in services trade analysis, are employed to describe how additional spending by tourists impacts the economy of Thailand.

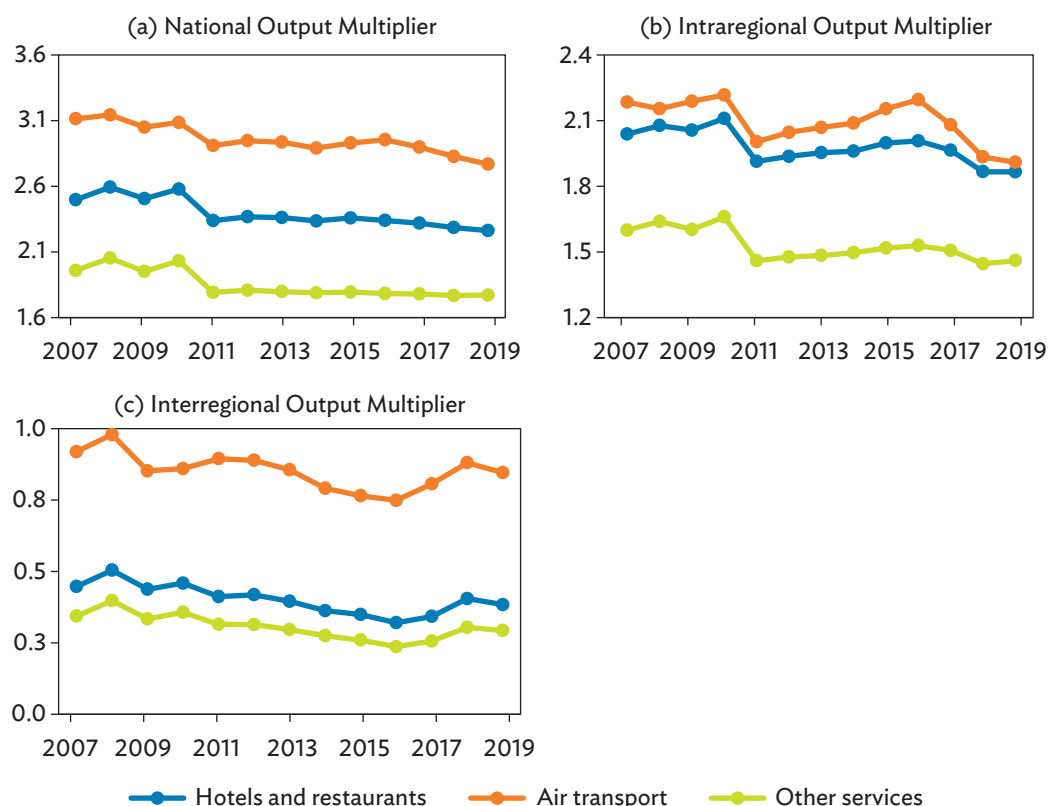
1. Intra- and Interregional Output Multipliers of the Tourism Industry

Output multipliers are used to estimate the impact of tourism activities on the economic output of Thailand. Using the MRIO, the output multiplier can be decomposed into intra- and interregional multipliers (Figure 2). Figure 2a presents the 2007–2019 output multipliers of the three sectors in Thailand, which share a common pattern. All three sectors have maintained a decreasing trend from 2008 onward, ranging from 3.14 to 2.77 for the air transport, 2.59 to 2.26 for hotels and restaurants, and 2.05 to 1.77 for other services. Thus, a \$1 increase in final demand for air transport, hotels and restaurants, and other services will stimulate global output (within and outside Thailand) by \$2.77–\$3.14, \$2.26–\$2.59, and \$1.77–\$2.05, respectively. The air transport sector has the largest output multiplier, indicating the strongest spillover effect from the tourism industry to the entire economy, followed by hotels and restaurants, and other service sectors. The 2008–2009 global financial crisis hit the Thai economy hard and reduced national economic productivity, which would also affect output multipliers in the tourism industry. Figure 2a also indicates that the output multiplier of tourism sectors has not rebounded to the precrisis level in the 12-year recovery.

The intraregional output multiplier measures the influence of the tourism industry on the destination economy. Figure 2b indicates that a \$1 increase in final demand for air transport in Thailand could stimulate a nationwide output increase of \$1.92 in 2019. The air transport sector still has the strongest intraregional output multiplier in the three representative tourism sectors. Compared with Figure 2a, a significant recovery pattern exists from 2011 onward. Particularly, the multiplier of air transport reached 2.21 in 2016, close to the precrisis level but followed by a downward trend from 2017 onwards.

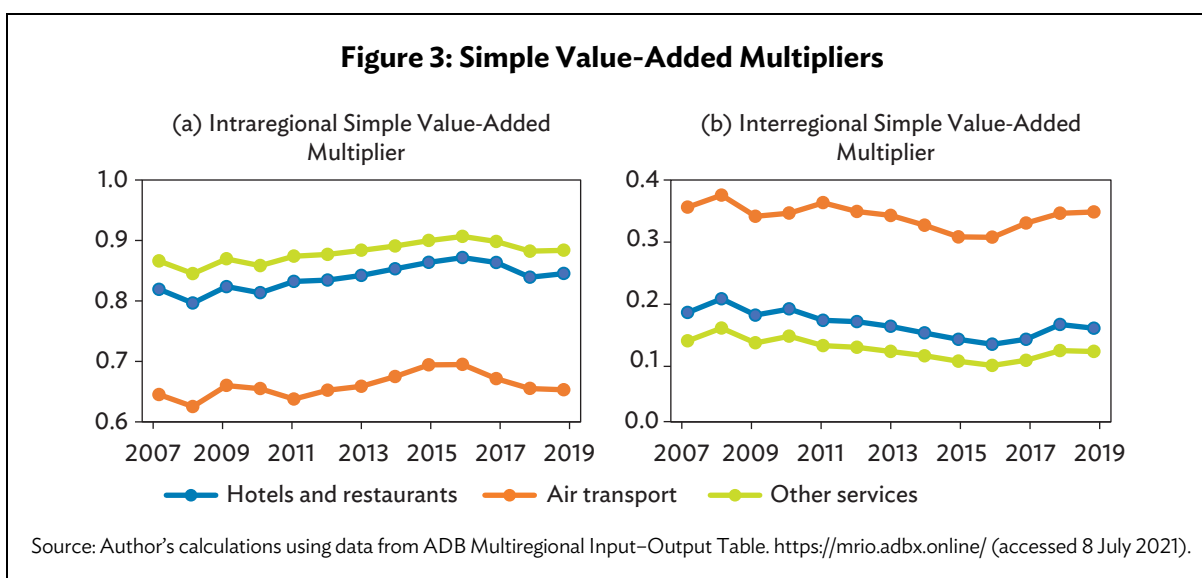
Figure 2c shows the trend of interregional output multipliers of the three sectors in 2007–2019. The interregional output multiplier indicates the response of other economies' or regions' output to the change in final tourism demand in Thailand. For example, the interregional output of air transport in 2019 is 0.85, which means that a \$1 final demand increase in the Thai air transport industry will lead to an increase in output outside Thailand by \$0.85. The interregional output multiplier measures the spillover effects of a change in one industry across the globe. Without the support of MRIO, the traditional single economy IO model has no capacity to capture this spillover effect. In addition, the pattern of interregional multipliers in Figure 2c diverges from Figure 3a. The global financial crisis and domestic political events in Thailand severely hit the Thai tourism industry. The interregional output multiplier of the three tourism sectors decreased by approximately 13% in 2009 compared with the precrisis level in 2008.

Figure 2: Thailand Tourism Output Multipliers



Source: Author's calculations using data from ADB Multiregional Input–Output Table. <https://mrio.adbx.online/> (accessed 8 July 2021).

After a marginal recovery, the output multiplier of air transport sector experienced a sustained decrease until 2016. The sector enjoyed a rebound in 2017 and 2018 and recovered to 0.88 but dropped to 0.85 in 2019. Hotels and restaurants and other service sectors followed the same pattern, with the air transport sector with smaller fluctuations. Consequently, the interregional multipliers of the two sectors had a downward trend from 2008 onward, recovered in 2017 and 2018, but declined again in 2019. The interregional output multiplier of the hotel and restaurant sector dropped to 0.38 in 2019 and the other services sector to 0.29.

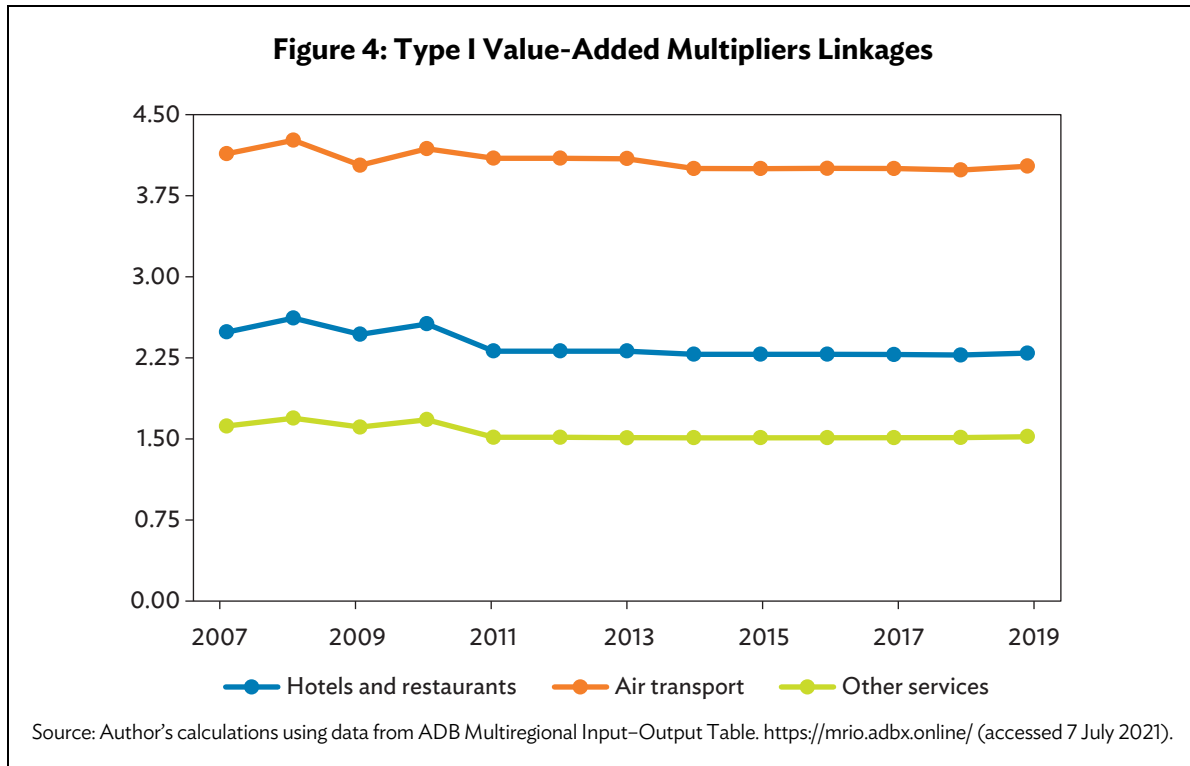


2. Simple Intra-regional and Inter-regional Value-Added Multiplier of the Tourism Industry

Figures 3a and 3b present the simple intra- and inter-value-added multipliers of Thailand based on the 2007–2019 MRIOs, respectively. The simple value-added multiplier measures the direct and indirect contribution of tourism development to GDP. For example, the simple intra- and inter-value-added multipliers of the hotel and restaurant sector in Thailand were 0.85 and 0.15 in 2019, respectively. This result indicates that a \$1 increase of the final demand in the sector boosted the value added of the Thai and global economy by \$0.85 and \$0.15, respectively. The contribution of the three sectors to the domestic economy experienced an increasing trend till 2016 and started to decrease from 2017 to 2019. The intra-regional multiplier of other services reached 0.88 in 2019, followed by 0.85 in the hotel and restaurant sector and 0.65 in the aviation sector. The interregional value-added multipliers presented a diverse trend with intra-regional multipliers. All three sectors experienced a decreasing trend from 2007 to 2016 and started to recover after that. The aviation sector demonstrated the largest contribution to global GDP, with the interregional simple value-added multiplier of 0.35, followed by the hotel and restaurant sector (0.15) and other services sector (0.12).

Apart from the simple multiplier, Figure 4 presents the 2007–2019 type I value-added multiplier of the three sectors. The trend of type I value-added multipliers of the three sectors is steady. The air transport sector presents the strongest multiplier, followed by hotels and restaurants and other services sectors. The multiplier of the air transport sector in 2019 was 4.02, which means that the total value added generated by aviation demand amounts to 402% more than the initial value added generated in the economy. The multiplier of hotel and restaurant and other services sectors

were 2.29 and 1.52, respectively, lower than the average level of the Thai economy (3.04). Thus, in line with the output multipliers, the air transport sector contributes to the economy more than the other two sectors.



B. Linkages

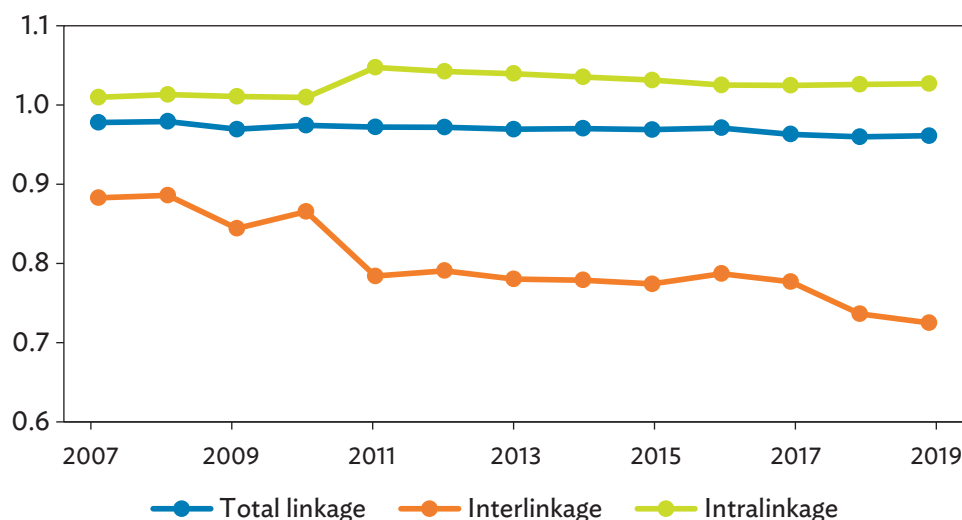
To examine the extent to which the tourism industry is dependent to domestically produced goods and services, this study presents the linkages in detail.

1. Total Backward Linkages

Total backward linkages measure how much output would be generated in the economy to supply a one unit increase in tourism production as well as induced production in the entire economy. The MRIO can help split linkages into interregional and intraregional backward linkages. The former measures the input required from other economies or regions to support the increase in tourism production demand in Thailand, whereas the latter sheds light on the input response of tourism production demand in Thailand. Figure 5 presents the backward linkages. After standardization, if the linkage is larger than the unit, it suggests the following: compared with the average level of all industries, the tourism industry has a stronger backward linkage with other industries. Otherwise, a linkage less than 1 indicates a weak connection with other industries. The total backward linkage remained steady at 0.97, which means that the backward linkage of the tourism industry is generally close to the average level. The total intra-backward linkage was slightly above the unit, whereas the inter-backward linkage dropped to 0.76 in 2019. Thus, compared with other sectors, the development of the tourism sector has more spillover impact on the downstream domestic economy than the global

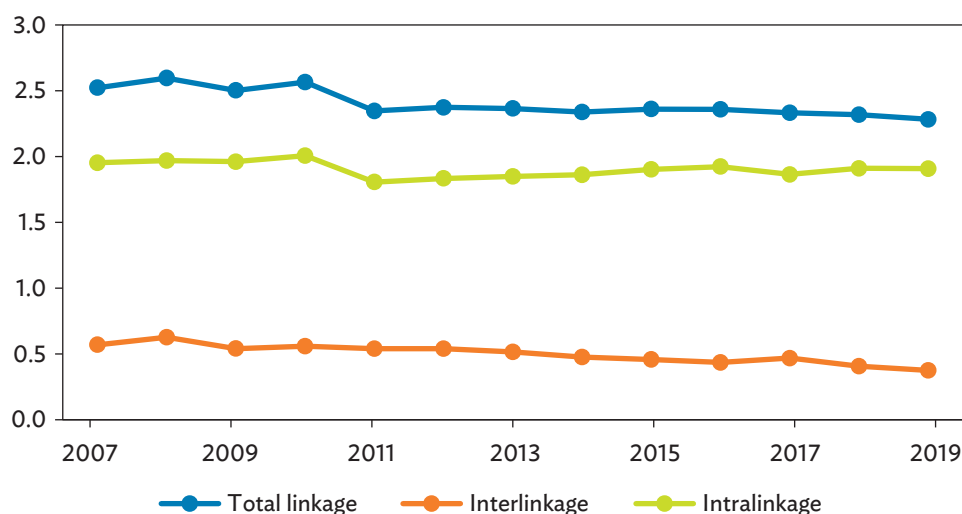
economy. Figure 6 presents the total linkages in absolute values. In line with standardized linkages, Table 6 shows that the tourism industry in Thailand had stronger intra-backward linkages but weaker inter-linkages. It suggests that the tourism industry in Thailand is more connected to the domestic economy than it is in the rest of the world.

Figure 5: Standardized Total Backward Linkages



Source: Author's calculations using data from ADB Multiregional Input–Output Table. <https://mrio.adbx.online/> (accessed 7 July 2021).

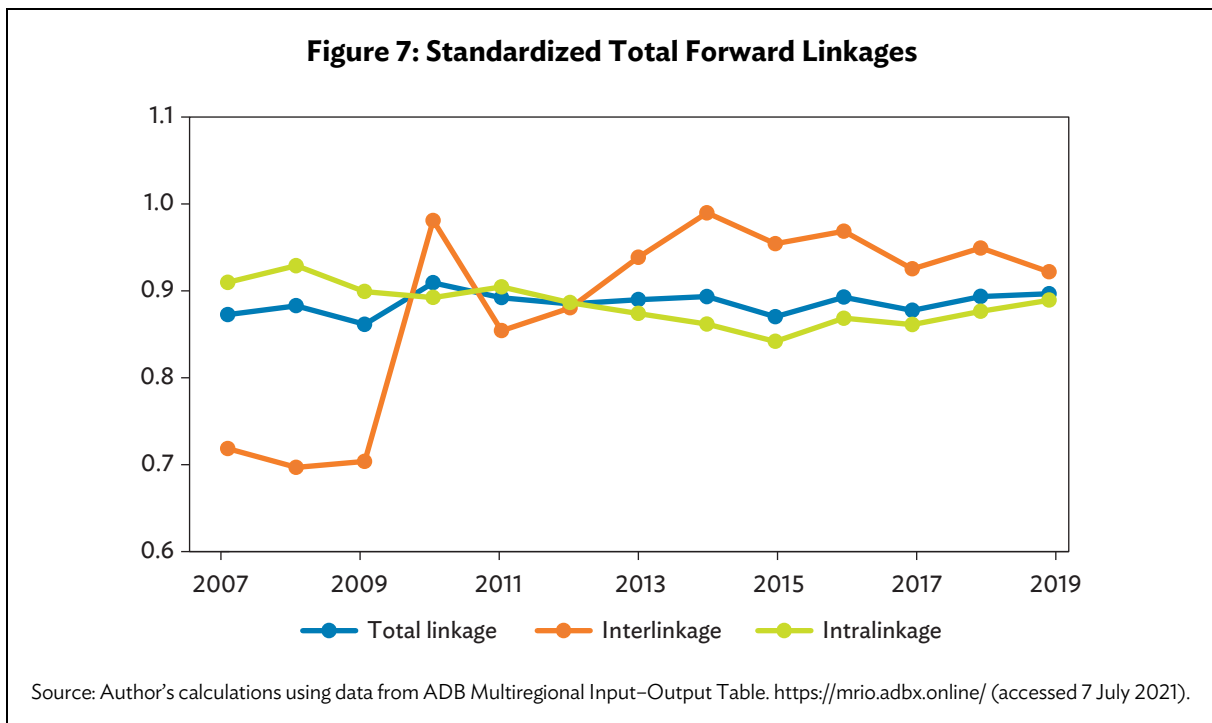
Figure 6: Total Backward Linkages

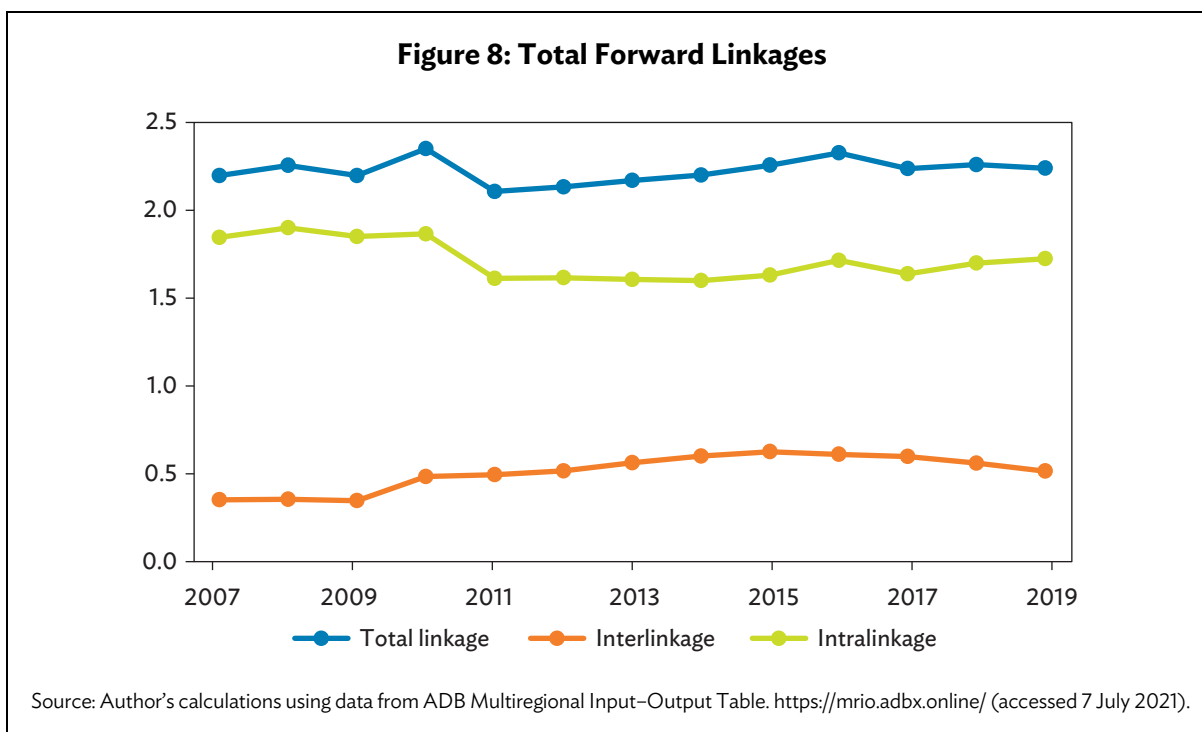


Source: Author's calculations using data from ADB Multiregional Input–Output Table. <https://mrio.adbx.online/> (accessed 7 July 2021).

2. Total Forward Linkages

Total forward linkage shows the value of total tourism output used by other industries as intermediate inputs to their production. Figure 7 presents the standardized total forward linkages, including intra- and inter-linkages of the Thailand tourism industry. All linkages in Figure 7 are less than one. In general, compared with other sectors, forward linkages of the tourism sector are weaker. Figure 8 demonstrates the trend of forward linkages in 2007–2019 in absolute values. Tourism products are more likely to be consumed as final demand than the intermediate products for other industries (Wu et al. 2019). Thus, forward linkages of the tourism industry are expected to be less than the backward linkages. However, an increasing trend was simultaneously observed in total, inter- and intra-forward linkages from 2011 onward. This finding indicates the growth of package tours and business travel over the time period, as revenues in those segments are more likely to be recognized as intermediate inputs than are those of individual visitors.



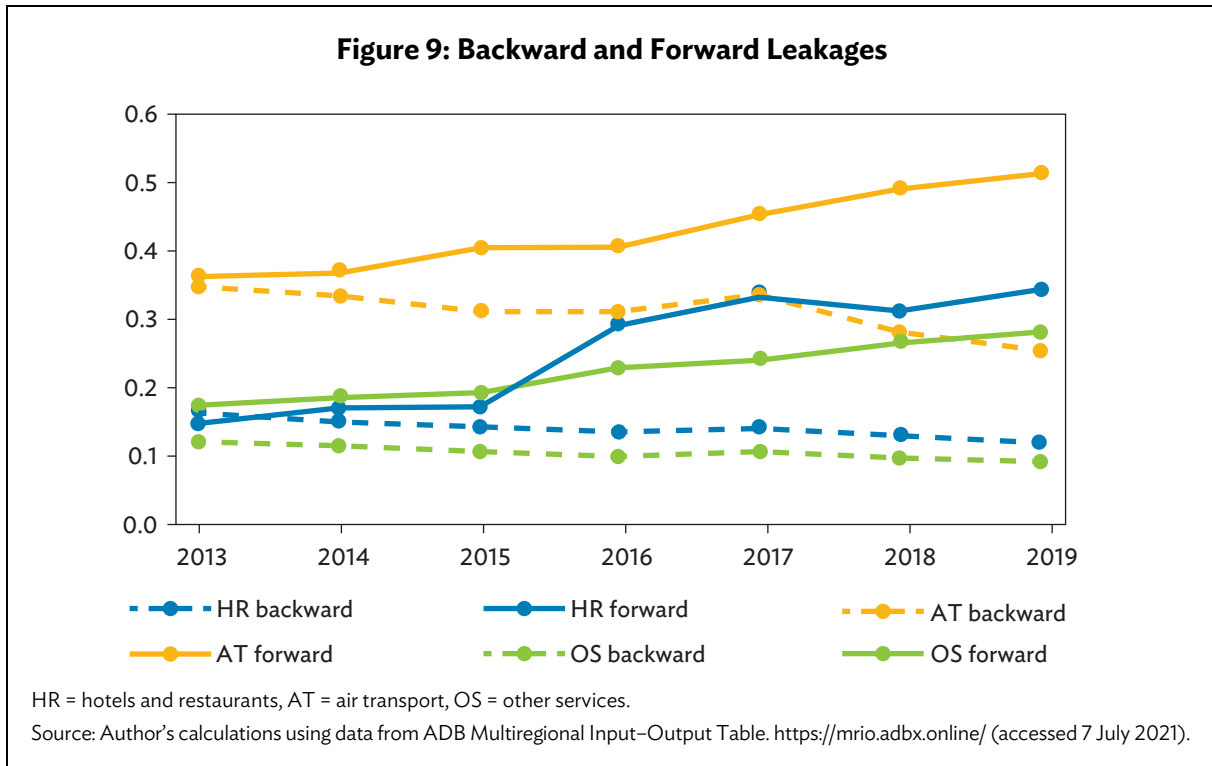


C. Leakages

Leakages, also referred to as the import multiplier, measure the response of imports of all industries to a unit change of final demand in the tourism industry. The leakage can also measure the upstream and downstream impact of the tourism industry on imports by backward and forward leakages, respectively. Figure 9 presents the backward and forward leakages of the hotel and restaurant, air transport, and other services sectors of Thailand. A sustained growing trend is observed in forward leakages in 2013–2019. The air transport forward leakage reached 0.51 in 2019, indicating that a \$1 increase in inputs of the air transport sector in Thailand will only increase the total amount of production accruing outside Thailand due to an increase in the total imported inputs required by the sector by \$0.51. The forward leakage of the hotel and restaurant sector surpassed the other services sector from 2016 onwards. This finding reveals that the spillover effect of primary inputs in the former sector on imports has become stronger than the latter sector. Nevertheless, the domestic economy can support the input requirements of hotels and restaurants and other services.

The backward leakages of the three sectors generally have less strength than forward leakages. It implies that, in the Thai tourism industry, the supply chain is dominated by imports and thus the industry depends on overseas markets more than the domestic market. In contrast to the trend of forward leakages, backward leakages experienced a steady and slightly decreasing trend in 2013–2019. The air transport sector also has the strongest backward leakage. For example, the leakage is 0.25 in 2019, which means that a \$1 increase in final demand in the Thai air transport sector will lead to an increase in the total amount of production accruing outside Thailand due to an increase in the total imported inputs required by the air transport sector of \$0.25. The backward leakages of the hotel and restaurant and the other services sectors in 2019 are 0.12 and 0.09, respectively.

In addition, for hotels and restaurants, backward leakages were higher than forward in 2007–2013 but were lower in 2014–2019, indicating a stronger expansion of the hospitality sector from the supply side. For air transport and other services, backward leakages were generally lower.



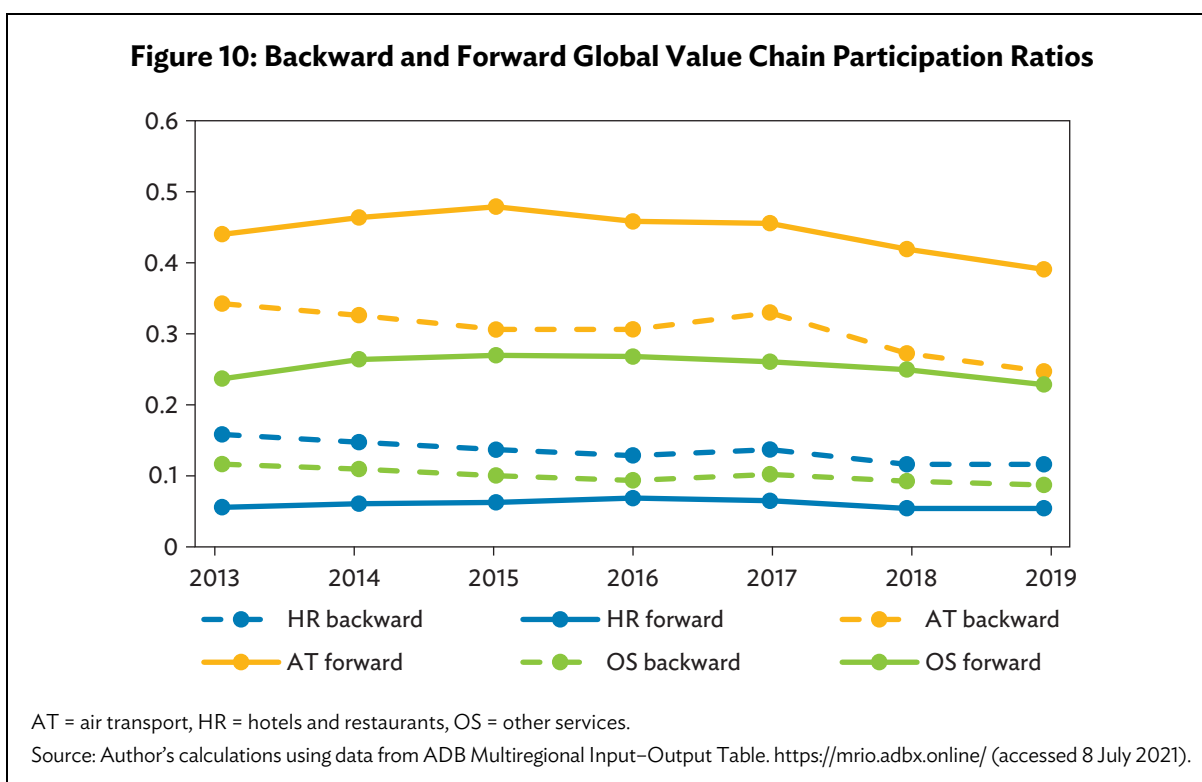
D. Global Supply Chain

One of the novelties of MRIO is it can capture the amount of value added absorbed into GVCs or sourced from GVCs and thus reasonably and accurately evaluate exports and the role an economy plays in the international supply chain.

1. Backward and Forward Global Value Chain Participation Ratio

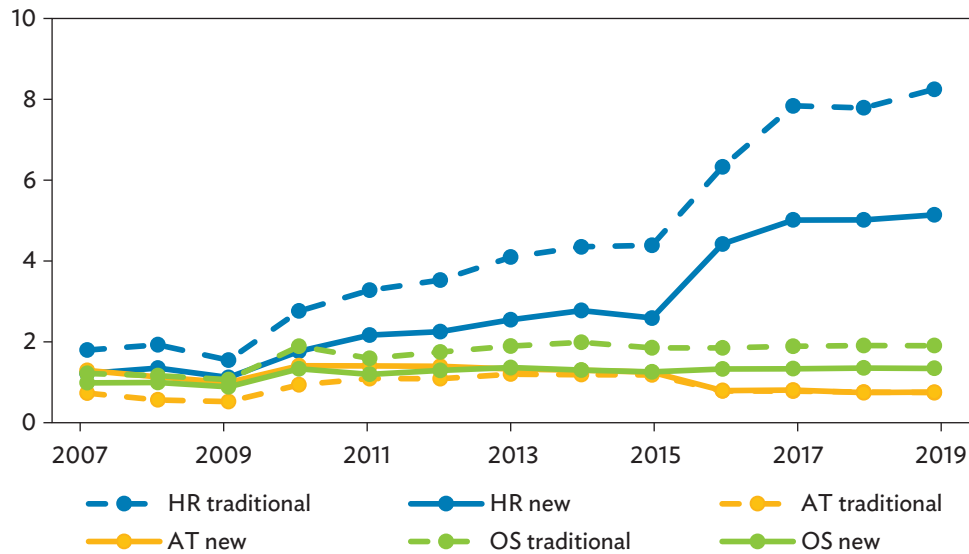
Figure 10 presents the backward and forward GVC participation ratios of the hotel and restaurant, air transport, and the other services sectors. The higher the backward ratio, the more final consumption is sourced from imports; whereas the higher the forward ratio, the more production is produced for intermediate exports. Air transport has the greatest backward and forward GVC participation ratio across the three sectors. Take the ratio of 2019 as an example, the backward ratio reveals that 25% of the final demand in the air transport sector is from intermediate imports; whereas the forward ratio indicates that the 39% value added produced by the air transport sector is used for intermediate exports. The two ratios profile the position of Thai air transport in GVCs. On the one hand, the Thai air transport sector relies highly on imports from other economies. On the other, a significant amount of its value added is imported by other economies as intermediates for value added production. In other words, the sector is highly involved in GVCs. The other services sector shares the same structure with the air transport sector in terms of backward and forward participation ratios. However, the hotel and

restaurant sector shows a different pattern. The two ratios are much smaller than the ones of the air transport sector, revealing that the hotel and restaurant sector is positioned more at the end of the value chain as more of its value added is directly used for consumption. The backward ratio is higher than the forward, indicating that the hotel and restaurant sector plays more as an importer rather than an exporter in the intermediate global trade in the sector.



2. Traditional and New Revealed Comparative Advantage

Figure 11 compares the traditional and new revealed comparative advantage of the three selected sectors. According to Leromain and Orefice (2014), given that TRCA and NRCA are based on the ratio between the economies' export performance to the global level, if it is larger than 1, it indicates a comparative advantage. Figure 11 shows that both the two indices support a comparative advantage in hotel and restaurant and other services sectors, whereas a less advantage in the air transport sector. In particular, the TRCA and NRCA of the hotel and restaurant sector surged from less than 2 in 2007 to 8.22 and 5.12 in 2019, respectively, which reflected the rapid and sustained growth of inbound tourism in Thailand over the time period. The weak performance of the aviation sector is in line with the information presented in Figure 11, because a large value amount in the air transport sector is used for intermediate exports and not for the production for final consumption. In addition, the hotel and restaurant and other services sectors also demonstrate that TRCA overestimates the export performance more than NRCA, which illustrates the superiority of the MRIO over the traditional one-economy IO model.

Figure 11: Traditional and New Revealed Comparative Advantage

HR = hotels and restaurants, AT = air transport, OS = other services.

Source: Author's calculations using data from ADB Multiregional Input-Output Table. <https://mrio.adb.online/> (accessed 8 July 2021).

V. CONCLUSIONS

This study develops an MRIO model to investigate the economic impact of the tourism industry in Thailand. The MRIO model is composed of 63 economies, and each economy is represented by 35 industries. Hotels and restaurants, air transport, and other services are selected to represent the tourism industry in the economy.

The air transport sector demonstrates the strongest output multipliers, followed by hotels and restaurants and other services. All three sectors present strong spillover effects to other industries in terms of outputs. MRIO reveals that the spillover effect is felt more by domestic industries than the globe. Although the air transport sector presents the strongest spillover effects to value added in overseas markets than the other tourism-related industries, such effects mostly benefit domestic industries. Compared with other industries in Thailand, tourism has stronger backward linkages with domestic industries but weaker connections with externals. The forward linkages of the tourism industry suggest that the linkage with downstream Thai and global industries is weaker than the average level of other industries in Thailand. In addition, imports to Thailand in the tourism industry are more likely to be used to support intermediate inputs than final consumption. The multiplier, linkage, and leakage analyses reveal that Thailand should maintain development of the tourism industry as a pillar industry, because it has strong spillover effects on other domestic industries and is well supported by the domestic economy.

In the role Thailand tourism industry plays in the global value chain, the backward and forward GVC ratios reveal that the percentage of final demand sourced from overseas markets is lower than the percentage of production for intermediate exports in the aviation and other services sectors. Thus, as one of the most popular inbound tourism destinations, Thailand is more likely to be positioned at the upstream end of the global value chain than at the downstream end. Moreover, the air transport sector is more deeply involved in the global value chain than the other two tourism-related sectors. However, the air transport sector has no comparative advantage in exports, whereas the hotel and restaurant and other services sectors do when compared with the average global level.

This study theoretically contributes by adopting the MRIO model on the analysis of the economic impact of tourism. The MRIO model not only focuses on the domestic contribution made by tourism development in Thailand but also sheds light on its impact on the global economy, which expands the tourism impact measurement from unidimensional development (i.e. domestic) to bidimensional (i.e. domestic and international) and assesses the impact more comprehensively. By introducing the contribution of Thailand's tourism industry to other economies, international organizations can use the informative and comprehensive information to develop strategic tourism development plans from the regional perspective. The MRIO model can also guide the focal destination in practice to improve the economic impact of tourism and the position of the industry in the global value chain.

The main limitation of this study is rooted in data availability. If the annual TSA is available for all selected economies, tourism and non-tourism products can be split. Thus, tourism activities can be assessed more accurately. This study adopted only Thailand as a case study. In future research, destinations with different characteristics, such as island economies, can be included for comparative research. Selected cases can even be expanded to economies in ASEAN and then investigate the economic impact of intra- and inter-ASEAN tourism. Finally, considering the vast impact of COVID-19 on global tourism, expanding the study from the time dimension and shedding light on the economic impact of tourism pre-, during-, and post crisis would be valuable.

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Impact of Tourism on Regional Economic Growth

A Global Value Chain Perspective

The economic impact of tourism development on economies in the global value chain remains understudied. Applying the multiregional input–output model to Thailand, the paper examines the economic contribution of tourism to its economy and to the global economy. Results reveal a strong spillover effect and linkage with domestic industries but weak connections with external industries of economies in the global supply chain. This study can help Thailand strategically position itself in the global value chain and aid regional organizations in highlighting tourism as a development–policy instrument for sustainable development.

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