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TOURISM INFLOW INTERLINKAGES WITH MERCHANDISE EXPORTS

AN AUGMENTED GRAVITY ANALYSIS FOR THE PACIFIC

Pralok Gupta, Sanchita Basu Das, Saarthak Sharma, and Ma. Veronica Domingo

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ABSTRACT

Pacific developing member countries (DMCs) depend heavily on international tourism, which can promote merchandise exports by reducing trade costs. This paper empirically analyzes tourist inflows as a determinant of merchandise exports for Pacific DMCs by deploying a gravity model technique. Other relevant variables that augment the model are trade agreements, language affinity, visa policies, etc. The paper finds that inbound tourism to Pacific DMCs significantly increases merchandise exports: a 1% increase in tourist inflows is associated with a 0.17% rise in merchandise exports in the region. This relationship is along expected lines, as international tourist arrivals can help reduce trade costs, increasing such exports. If international tourists come from countries with a shared language and that have formed an economic partnership through free trade agreements and easy visa policies, the increase is bigger. Based on the findings, the paper recommends that inbound tourism be used to develop other industries such as garments or souvenir-related manufacturing in countries in the region. These products hold good export potential, provided they can be customized to the tastes and preferences of international tourists.

Keywords: tourism, international trade, Pacific developing member countries

JEL codes: C33, F14, L83, Z38

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1.0 Introduction

The tourism sector has grown significantly over the past 2 decades. Globally, international tourist arrivals peaked at 1.46 billion in 2019, up from 809 million in 2005 (UN Tourism¹ 2023). Meanwhile, trade in tourism services touched \$1.71 trillion, doubling its value from 2005. The coronavirus disease (COVID-19) pandemic interrupted the tourism economy across the globe, but the sector is now gradually recovering.

Tourism services exports depend significantly on transport and travel services. Transport and travel services together have accounted for a share of around 38% of trade in services, compared to 12% for telecom services and 9.5% for financial services, two other prominent services sectors.² The rise of low-cost carriers, implementation of open skies policies, and easier visa procedures, regionally and globally, have significantly boosted demand for air transport services and growth in international tourism.

Tourism is considered the most inclusive service sector and directly and indirectly benefits many sectors, including manufacturing, at various stages of development. International tourist expenditures in the host country create value across tourism activities, including sectors such as hospitality, transport, retail, entertainment and cultural activities, and others. Indirectly, tourism contributes to income in other sectors, such as telecoms and financial services. Tourism also drives construction (infrastructure and accommodation) and the meetings, incentives, conferences, and exhibitions industry. Demand for goods also increases as tourists become more familiar with the products of their host country.

The literature is scant on the benefits of tourism to the merchandise sector, even more so for regions that depend heavily on the sector. Industry and sector specialists often discuss tourism but attention is inadequate in international economics. Tourism inflows and their impact on merchandise trade is not discussed enough within standard international trade models. Moreover, such discussion is severely lacking for economies and regions such as Pacific developing member countries (DMCs).

Pacific DMCs depend highly on international tourism, more particularly as a form of service export. In 2019, before COVID-19, tourism exports were more than 50% of services exports in many economies in the region, compared to an average of around 31% for Asia and the Pacific. The share was 89% for Tuvalu, Vanuatu (85%), and Fiji (84%) in 2019. Tourism exports relative to total exports of goods and services in 2019 in the region were also high, at more than 50.0%, compared to an average of 5.8% for Asia and the Pacific. Tuvalu (86%), Vanuatu (73%), and Samoa (62%) are the top-three countries in share of tourism exports to total exports. Notably, such high dependence on tourism indicates limited economic diversification in these countries, which makes them vulnerable to external shocks, as observed during COVID-19. In this situation, it is crucial to understand how tourism links to other sectors of the economy and merchandise trade. This can allow governments to identify sectors that can benefit from tourism spending and that can be considered for greater production and international trade. This will also help Pacific DMCs to diversify their economic activities.

¹ The data was collected from the World Tourism Organization (UNWTO) website. The UNWTO was renamed as UN Tourism on January 23, 2024.

² World Trade Organization. [WTO Stats \(accessed January 22, 2024\)](#).

Against this background, this paper looks closely at how tourism inflows interlink with merchandise exports, focusing on the Pacific subregion. To analyze these interlinkages, the paper deploys an augmented gravity model of international trade, with suitable advancements.

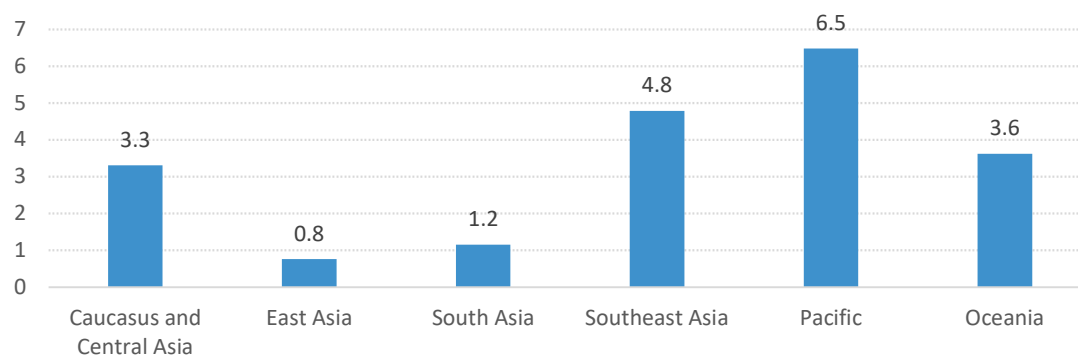
Section 2 looks at the tourism sector in the Pacific. Section 3 examines the existing literature and identifies gaps in discussion. Section 4 presents the conceptual underpinnings of the gravity model, methodology of the empirical estimation of this study and discussion of the results and section 5 concludes and provides policy recommendations.

2.0 Trends and Stylized Facts about Tourism in the Pacific

In discussing the importance of tourism sector for Pacific DMCs, covering both domestic and external indicators, this section analyzes data for 2005–2022 to assess trends pre-COVID-19, through 2019, and post-COVID-19 (2021 and 2022). It compares the subregion to Asia and the Pacific as a whole, as needed. Interesting characteristics of the tourism sector in the Pacific, include the following:

First, tourism is vital for Pacific DMCs. Indeed, at 6.5% of gross domestic product (GDP) in the Pacific, tourism exports are the largest among Asia and the Pacific subregions (Figure 1a). Tourism exports as share of GDP are significantly high in Palau (35.9%), Vanuatu (32%), Fiji (23.7%), and Samoa (22.2%) (Figure 1b). Tourism also fuels the domestic economy in many of the countries in the region, as international tourists increase demand for goods and services, which creates employment, stimulates investment, and generates foreign exchange earnings.

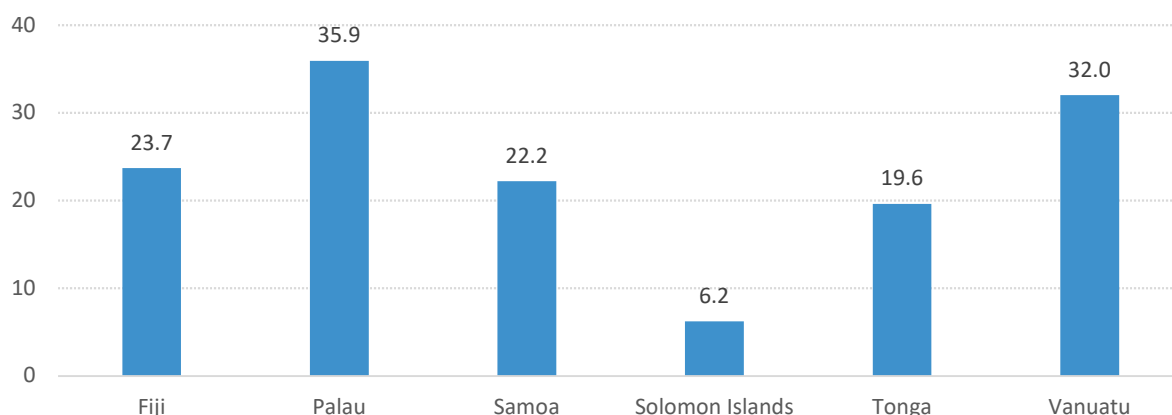
Figure 1a: Tourism Exports in Asia and the Pacific, 2019 (% of GDP)



GDP = gross domestic product

Note: Caucasus and Central Asia comprises Armenia, Azerbaijan, Georgia, Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan. East Asia comprises Japan, Mongolia, the People's Republic of China, the Republic of Korea, Hong Kong, China; and Taipei, China. South Asia comprises Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Southeast Asia comprises Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, the Philippines, Singapore, Thailand, and Timor-Leste. The Pacific comprises the Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Oceania comprises Australia and New Zealand.

Source: Asian Development Bank. 2023. *Pacific Economic Monitor December 2023*. Manila.

Figure 1b: Tourism Exports in the Pacific, 2019 (% of GDP)

GDP = gross domestic product

Source: Asian Development Bank. 2023. *Pacific Economic Monitor December 2023*. Manila.

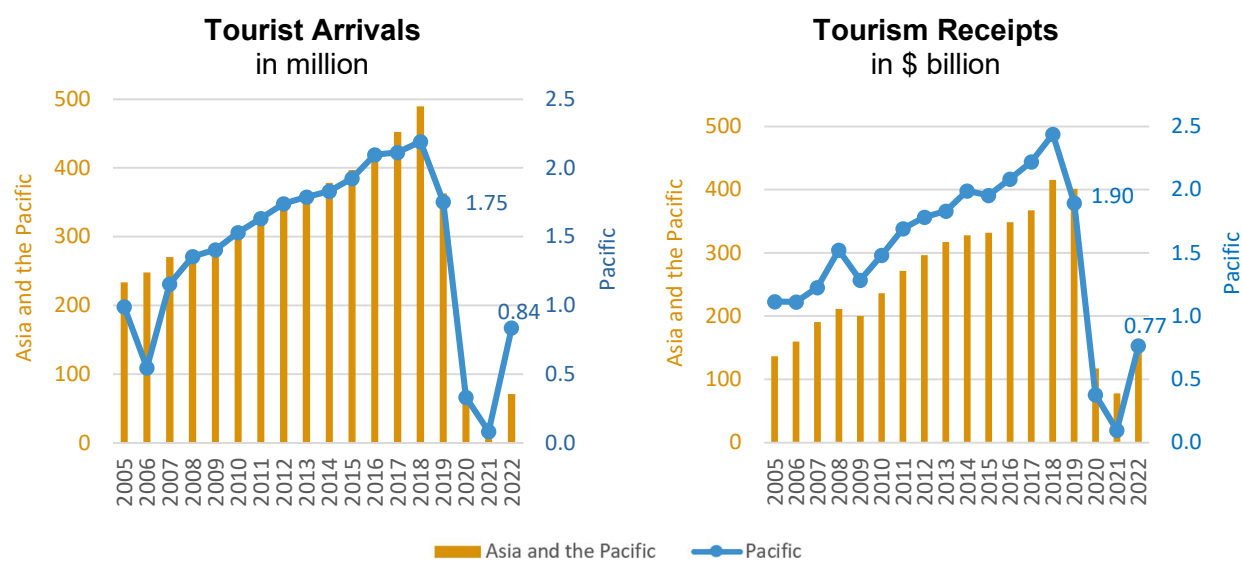
Second, while Pacific DMCs are a small share of total arrivals and tourism receipts in Asia and the Pacific as a whole, tourists spending patterns are high. In 2019, 1.7 million tourists arrived in Pacific DMCs, generating \$1.9 billion in tourism receipts. This constituted 0.5% of Asia and the Pacific's total international arrivals and 0.3% of its total tourism receipts. The absolute number of arrivals and receipts plunged during the pandemic, but by the end of 2022, Pacific DMCs had recovered 48% of pre-pandemic arrivals and 40% of 2019 tourism receipts (Figure 2). In 2019, Pacific DMCs collectively generated \$1,080 per arrival compared to East Asia's \$966 and Southeast Asia's \$1,060. The relatively high tourism receipts per arrival indicates that destinations in the Pacific attract visitors with high propensity to spend.

Third, tourism exports account for a large share of Pacific DMCs' total exports. Prior to the pandemic, tourism exports constituted around 31% on average of services exports in Asia and the Pacific, but the share was more than 50% in most Pacific DMCs. In 2019, 89% of services exports in Tuvalu were attributed to tourism exports, followed by Vanuatu (85%) and Fiji (84%) (Figure 3). Tourism exports also accounted for more than half of total exports of goods and services, compared with the regional average of 5.8%. Within the subregion, tourism exports to total exports was highest in Tuvalu (86%), Vanuatu (73%), and Samoa (62%) (Figure 3). Clearly, economies in the Pacific rely on tourism amid limited economic diversification.

Fourth, tourism exports offset merchandise trade deficits. While most economies in the Pacific subregion have a merchandise trade deficit, several run a current account surplus (Table 1). Moreover, the share of tourism exports to the trade balance is more than 100% in the Cook Islands (165.5%), Fiji (135.7%), Solomon Islands (274%), and Vanuatu (108.7%). This makes clear that tourism exports mitigate merchandise trade deficits in economies in the subregion and generate significant foreign exchange reserves in many economies. However, strong reliance on tourism makes Pacific DMCs extremely vulnerable to external shocks. During the COVID-19 pandemic, the absence of international tourism widened the Pacific trade deficits: Samoa's goods and services trade deficit widened from 13.4% of GDP in 2019 to 40.4% in 2022.³

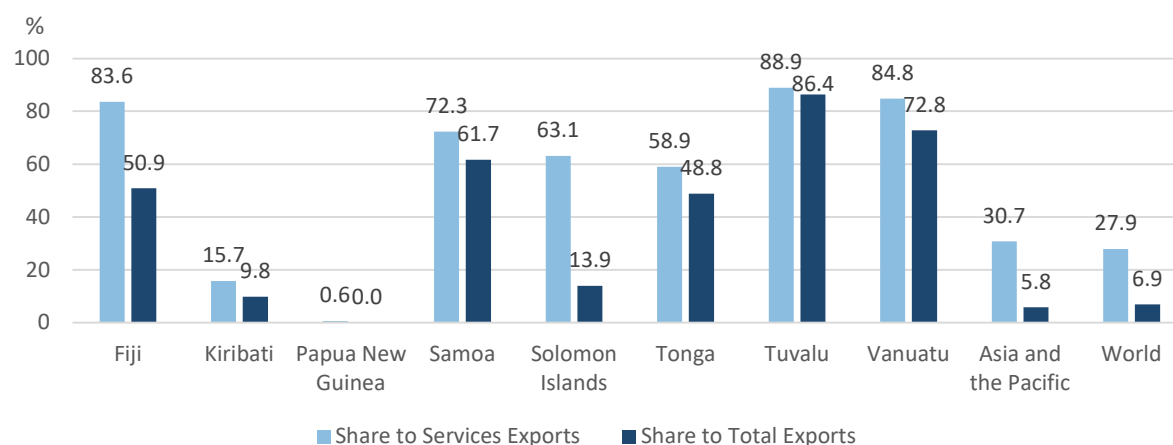
³ Asian Development Bank. 2023. *Pacific Economic Monitor December 2023*. Manila.

Figure 2: Tourism Performance of Asia and the Pacific and the Pacific Subregion



Source: ADB calculations using data from UN Tourism. 2023. *Tourism's Importance for Growth Highlighted in World Economic Outlook Report*. <https://www.unwto.org/news/tourism-s-importance-for-growth-highlighted-in-world-economic-outlook-report>.

Figure 3: Share of Tourism Exports in Services Exports and Total Exports in Pacific DMCs, 2019



Note: Data not available for the Cook Islands, the Federated States of Micronesia, the Marshall Islands, Nauru, Niue, and Palau.

Sources: Asian Development Bank. 2023. *Pacific Economic Monitor December 2023*. Manila.

Overall, tourism exports are vital in the long-term growth of many economies in the Pacific. While a very small portion of total tourism exports in Asia and the Pacific can be attributed to the Pacific subregion, potential to expand its tourism exports exists through enabling policies (i.e., better customs, immigration and quarantine services, visa exemption and visa-on-arrival facilities, investment incentives), better connectivity and destination infrastructure (e.g., roads, utilities), and enhanced regional cooperation. The COVID-19 pandemic highlighted the Pacific's strong dependence on tourism, leaving its economies very vulnerable to external shocks, as noted.

Pacific DMCs must therefore diversify by strengthening industries that benefit from tourism (i.e., food production, handicrafts). By doing so, Pacific DMCs can become more resilient to future crises.

Table 1: Pacific Tourism Exports and External Sector Indicators, 2019

Economy	Current Account	Trade Balance (\$ billion)	Tourism Exports (\$ billion)	Tourism Exports (% of trade balance)
	Balance (% of GDP)			
Cook Islands	33.2	(0.12)	0.2	165.5
FSM	23.1	(0.13)
Fiji	(4.7)	(0.96)	1.3	135.7
Kiribati	48.5	(0.09)	0	0.0
Marshall Islands	(24.4)	(0.13)	0	0.0
Nauru	4.9	(0.05)
Niue
Palau	(31.1)	(0.14)	0.1	69.9
Papua New Guinea	22.1	7.47	0	0.0
Samoa	3.0	(0.30)	0.2	66.8
Solomon Islands	(9.8)	(0.04)	0.1	274.0
Tonga	(0.8)	(0.21)	0.1	48.6
Tuvalu	(16.9)	(0.04)	0	0.0
Vanuatu	12.8	(0.28)	0.3	108.7

FSM = Federated States of Micronesia.

... = not available, () = negative, GDP = gross domestic product.

Source: Asian Development Bank. 2023. *Pacific Economic Monitor December 2023*. Manila.

3.0 Literature review: Tourism Services and Merchandise Trade

Previous studies examine the causal relationship between tourism and trade. On one hand, trade can stimulate growth of international travel. First, forging and maintaining trade linkages between economies often require business travel (Shan and Wilson 2001; Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2011a; Kumar, Prashar, and Jana 2019). As exports and imports flourish, succeeding business trips are necessary to negotiate new deals and, these frequent trips can motivate business travelers to visit the partner economy for leisure (Kulendran and Wilson 2000). Second, trade can reduce the costs of developing tourism markets, since the infrastructure (e.g., transport, telecommunications) needed to move goods is also vital for travel (Leitão 2010; Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2016). Finally, trade liberalization improves market access to products, encourages competition, and boosts trade activities, which promotes greater cross-border travel (Wong and Tang 2010; El-Sahli 2017).

On the other hand, international tourism can also influence trade. The rise of tourist inflows can catalyze import demand for goods and services essential to foreign visitors' consumption in a destination (Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2011a; Shan and Wilson 2001). At the same time, tourists can determine potential business opportunities, which can lead to exports or imports of products (Kulendran and Wilson 2000; Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2011b). While trade can decrease the cost of tourism development, tourism can also lessen transaction costs associated with trade. International

tourism enables both visitors and host communities to understand and learn more about other's cultures, which could minimize the gaps in information (Santana-Gallego, Ledesma- Rodríguez, and Pérez-Rodríguez 2016). In addition, inbound tourism enables domestic firms to promote their products to a foreign market without spending on an expensive overseas marketing campaign (Brau and Pinna 2013).

Empirical studies have investigated the causality between international tourism and trade.

The study of Kulendran and Wilson (2000) examined the long-run relationship between foreign trade and international tourism using co-integration and Granger-causality methodology. The findings show that bidirectional causality between inbound travel and trade exists for Australia and two of its trading partners, the United States (US) and Japan. Other studies find evidence of two-way causality between tourism and trade for the People's Republic of China (Shan and Wilson 2001), South Africa (Fry, Saayman, and Saayman 2010), Canary Islands (Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2011b), Tunisia and Morocco (Ozcan 2016), and in Organisation for Economic Co-operation and Development (OECD) countries (Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2011a). Contrary to the findings of other studies, Khan, Toh, and Chua (2005) conclude that for Singapore, only business arrivals and imports from its five partner economies (i.e., Association of Southeast Asian Nations, Australia, Japan, the US, and the United Kingdom) are significantly correlated, and that the causality runs from imports to business arrivals. Lee (2012), which also focuses on Singapore, affirm the unidirectional causality between tourism and trade. However, the results reveal that international tourism is a determinant of imports in Singapore. For Malaysia, Kadir and Jussof (2010) show a one-way causal effect running from exports to international tourist receipts, and from imports to international tourist receipts. The results suggest that the main purpose of Malaysia's tourist arrivals is business travel. Meanwhile, for the US, Kumar, Prashar, and Jana (2019) conclude that international tourism does not affect international trade and output.

Other related literature focused on the effect of tourism to the trade of certain commodities.

Madaleno, Eusébio, and Varum (2017), who explore the impact of inbound tourism on the trade of agro-food products in Portugal, reveal causality between tourism and trade, but the significance and direction of causality differ across products. For instance, there's a bidirectional short-run causality between inbound tourism and total exports of wine. However, the exports of canned fish and cheese are likely to stimulate inbound tourism to Portugal but not the other way around. El-Sahli (2017) analyze the empirical link between tourist and trade flows of 135 economies using product-level trade data to determine which type of products are more likely to be affected by tourism. Based on the findings, an increase in the number of inbound tourists lead to a rise in the exports of differentiated products (i.e., processed food products and consumer goods) with an elasticity of around 1. The results of these two studies recommend that since tourism can spur export growth, economies can leverage tourism to advance the export of certain commodities, which can lead to greater economic growth.

Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez (2016) estimate the impact of tourism on international trade. Tourism flows were included as a determinant in the modified gravity equation model to consider tourism's effect on promoting merchandise trade among economies. The estimation results indicate that, in the cross-section of 195 countries, a 1% increase in tourist arrivals raises export volume from the destination economy to the tourist's place of origin by 9%. The study indicates that tourism is a significant determinant of trade and, disregarding tourism in the trade gravity equation, can lead to biased estimates.

The discussion here shows that while studies have examined the linkage between tourism and merchandise trade, most of these studies utilize the Granger causality test. Moreover,

no literature has analyzed the relationship between tourism and merchandise trade in the context of Pacific DMCs. Hence, this study fills an important gap in the existing literature pertaining to tourism sector interlinkages with merchandise exports for the Pacific subregion.

4.0 Tourism Sector Interlinkages with Merchandise Exports: Augmented Gravity Model

4.1 Conceptual Underpinnings

We examine the interlinkages between tourism services and merchandise trade by deploying econometric models, namely the augmented gravity models with various variations. To conduct this exercise, we utilize a number of quantitative variables. The selection of these variables is based on two considerations. First, these variables help improve the model's explanatory power or cater to specific issues in the model and provide other important insights. Second, precedence exists for using such variables in augmented gravity models in the existing literature, such as Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez (2016).

We choose the augmented gravity model framework for this study because of certain advantages. The gravity model has evolved into a diverse estimation technique that is amenable to various kinds of analysis, ranging from examination of trade openness to determination of the impact of different variables on trade. The gravity model is flexible and has generated a vast amount of literature as one of the most deployed empirical models of international trade since its use by Tinbergen (1962). Though gravity models are sometimes criticized for a lack of theoretical underpinnings of the estimated equations, a number of economists believe that gravity models can be explained by Heckscher–Ohlin models of international trade (Deardorff 1998).

The traditional gravity model is described by the equation:

$$\log X_{ij} = a + b_1 \log GDP_i + b_2 \log GDP_j + b_3 \log T_{ij} + e_{ij}$$

Where X_{ij} refers to the exports from country i to j , GDP_i is the GDP of the exporting country, and GDP_j is the GDP of the importing country. T_{ij} refers to the cost of doing trade between country i and j . The standard gravity model framework assumes that distance is a proxy for the trade costs between two countries. However, following the literature of gravity models and the flexibility they offer, a number of other variables are added that have implications for bilateral trade costs in the advanced gravity models. These are called augmented gravity models. In our study, we also account for new variables such as language, free trade agreements, visa policies, having a common coloniser (effects of determinism), and the geographical effects (trade amongst countries that are island nations) based on Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez (2016) to augment our gravity model.

One of the most referenced papers on the augmented gravity models is that of Anderson and van Wincoop (2003). In this paper, Anderson and van Wincoop develop a robust gravity model with consistent and efficient estimates by incorporating multilateral as well as bilateral trade resistances. The approach formulated in Anderson and van Wincoop is driven by the following equations:

$$\log X_{ij} = \log Y_i + \log Y_j - \log Y + (1 - \sigma) [\log T_{ij} - \log \pi_{ij} - \log P_j]$$

where,

$$\pi_{ij} = \sum_{j=1}^c \left\{ \frac{T_{ij}}{P_j} \right\}^{1-\sigma} \frac{Y_j}{Y} \quad (\text{eq. 1})$$

$$P_j = \sum_{i=1}^c \left\{ \frac{T_{ij}}{P_i} \right\}^{1-\sigma} \frac{Y_i}{Y} \quad (\text{eq. 2})$$

Here, T_{ij} refers to other variables that cover bilateral trade costs, particularly variables that are binary, such as language, regional trade agreement/free trade agreement, common colonizer. Y_i and Y_j represent the GDP of the exporting and importing country. Y represents world GDP.

Equation 1 represents outward multilateral resistance, and essentially captures that exports from country i to country j is dependent on trade costs across all possible export markets. Equation 2 represents inward multilateral resistance, and likewise captures the dependence of imports into country j from country i on trade costs across all possible suppliers. Together, these terms are the key to the model, and they resolve both problematic issues identified by the critics in the intuitive gravity model. In our study, we intend to capture the impact of such variables by utilizing country-fixed effects.

4.2 Augmented Gravity Model Equation for the Study and Data Sources:

We use the following gravity model equation for our empirical analysis:

$$\text{LogExp}_{ijt} = \alpha + \beta_1 \text{Log Tourinb}_{ijt} + \beta_2 \text{Log Gdpexp}_{it} + \beta_3 \text{Log Gdpimp}_{jt} + \beta_4 \text{Log Wdist}_{ijt} + \beta_5 \text{Languagedummy} + \beta_7 \text{FTAdummy} + \beta_8 \text{Visapolicydummy} + \beta_9 \text{Commoncolonizerdummy} + \beta_{10} \text{Islandsdummy} + \varepsilon_{ijt}$$

Where, α is the intercept term; β 's are the coefficient terms; Exp_{ijt} is exports from country i to country j at time t (Dependent Variable); Tourinb_{ijt} is the number of tourist arrivals to country i from country j at time t ; Gdpexp_{it} is the nominal GDP of country i (exporter of goods) at time t ; Gdpimp_{jt} is the nominal GDP of country j (importer of goods) at time t ; Wdist_{ijt} is the distance between countries i and j weighted by the nominal GDPs of the respective countries at time t ; Languagedummy is a binary dummy variable for common language; FTAdummy is a binary dummy variable for regional/bilateral free-trade agreement; Visapolicydummy is a binary dummy variable for visa on arrival or visa-free access policy; Islandsdummy is a binary dummy variable for the exporter and importer both being island countries; and $\text{Commoncolonizerdummy}$ is a binary dummy variable for the exporter and importer countries in the pair that have had a common colonizer.

The proposed model posits a log-log structure for continuous variables and employs logarithmic-exponential conversion for categorical variables. The data sources for the variables used in the above equation and intuitive relation with the dependent variable (merchandise exports of country i) are presented in Appendix 1.

One of the variables, which is a part of all gravity models in the existing literature, is the distance between two countries. In this study, we estimate this distance between the exporting country i and importing country j as the distance between their capitals. However, this approach creates inconsistency as distance remains a constant over time. For making the distance a variable, we convert the distance into the weighted distance by using a formula provided by Chakraborty and Aggarwal (2017) and Turkcan and Ates (2010) as below:

$$\text{WDIST}_{ijt} = \frac{\text{DIST}_{ij} * \text{Gdpexp}_{it}}{\sum_{i=1}^n \text{Gdpexp}_{it}}$$

DIST_{ij} represents the distance between the capitals of country i and j . Here, GDP_{it} represents the GDP of the exporting partner at time t .

4.3 Empirical Estimation and Results

4.3.1 Data Specification and Summary Statistics

This study considers bilateral inbound tourism and merchandise exports data of 14 Pacific DMCs: The Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, the Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu, with 53 countries for 2010–2020. A total of 1,983 observations were used in the augmented gravity model analysis after accounting for missing data. Appendix 2 provides the summary statistics of the dataset for the augmented gravity model used in this study.

4.3.2 Preliminary Diagnostics

We conduct preliminary diagnostics to identify potential issues that can create inefficiencies in the data or cause bias. First, we check for multicollinearity in our data and apply the Philip Ender Collin Program (Ender 2015), a diagnostic tool for examining collinearity-related issues. The results of this test indicate that the Variance Inflation Factor (VIF) for all variables used in our analysis is far below the generally tolerated level. We further applied the Hausman test to distinguish between the fixed effect and random effect models for panel data structures. The Hausman test indicates that the fixed-effect model corresponds better to our dataset. Further diagnostics for heteroskedasticity and serial auto-correlation examined by using the Kit-Baum test for heteroskedasticity (Baum 2000) and the Pesaran test for first-order serial-autocorrelation in fixed effect models (Pesaran 2004) indicate the presence of both issues.

To refine our modelling approach based on the contextual literature of the past, we internalise the recommendations made in econometric literature, namely (Hoechle 2007) and (Beck and Katz 1995). Following the principles as described in these papers, we used a Feasible Generalized Least Squares model for our empirical estimation. We also make specifications for heteroskedasticity and serial autocorrelation in STATA commands while estimating our model that help us combat these specific issues.

4.3.3 Model Estimation and Robustness Check

We first introduce standard gravity variables in our model, namely, GDP of exporting and importing countries, weighted distance and language dummy, along with our key variable, inbound tourism. Subsequently, we augment the model by introducing other important variables (dummy), visa policy, FTA, island pair and common colonizer. This makes the estimated model equation the same as the augmented gravity model equation presented in section 4.2. **This is our main model for empirical estimation and the estimation results are presented as “Main Model” in Table 2.**

We did the robustness check of our main model as we recognise the issue of endogeneity in the model, as is the case with several trade-related models. Though the literature suggests use of instrumental variables (IVs) for removing endogeneity, identifying suitable IVs that are

exogenous to all unobserved elements in the model and highly related to the observed covariates, is difficult and akin to the search for the Holy Grail (Chan et al. 2014). Nonetheless, we found average annual temperature difference in the origin and destination countries as a useful IV for the purpose of our study through literature search, such as Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez (2016). We collected and included the data on average annual temperature difference in the origin and destination countries in our dataset and ran the IV regression. The results of robustness check through IV regression are presented in the third column in Table 2.

To account for multilateral trade resistances, we introduce country and time fixed effects in our main model as a further robustness check. Existing literature (Baltagi, Song and Koh 2003; Baldwin and Taglioni 2006; Baier and Bergstrand, 2007) suggests use of country-time fixed effects to approximate the unobservable but potentially time-varying multilateral trade resistances along with ordered country-pair fixed effects for controlling unobservable but time-constant heterogeneity in the model. We take 5 years' data (pre-COVID-19) from 2016 to 2019 for robustness check using country and time fixed effects. A large number of studies that use gravity models with multilateral trade resistance and reasonable large number of countries and time observations work with 5 years' data (such as Baier and Bergstrand 2007; Subramanian and Wei 2003; Eicher and Henn 2011, as cited in Chan et al. (2014)). Hence, we take 5 years' data in our model that account for multilateral trade resistance. The results of introducing such fixed effects are displayed in the fourth column in Table 2.

4.4 Discussion of Estimation Results

4.4.1 Results of Augmented Gravity Model (Main Model)

When we apply our main model, i.e., augmented gravity model, to our research question, we find that inbound tourism has a significant and positive effect on the exports of the Pacific DMC to which such tourists arrive. A 1% increase in inbound tourists is associated with a 0.17% rise in exports. This relation is along expected lines, as international tourists' arrivals can help reduce trade costs, thereby increasing merchandise exports in two ways: first through improved knowledge of foreign culture and business practices in other countries; and second, by facilitating and stimulating learning other languages, which makes bilateral trade easier (Santana-Gallego, Ledesma-Rodríguez, and Pérez-Rodríguez 2016).

We also find that the GDP of the exporting country and importing country have a positive association with the log of exports in our model. The weighted distance is negatively related to the log of exports. This supports the hypothesis that distance between two countries matters for having bilateral trade between the two countries. These are standard augmented gravity model results.

Table 2: Gravity Model Results for the Pacific Subregion

Independent Variables	Main Model	Robustness Check Models	
	Augmented Gravity Model	IV Regression Model	Fixed Effects Model
Constant	-54.05695*** (1.426309)	185.5806 (143.3544)	-29.87436 (18.78255)
Lntourinb _{ijt}	0.1726759*** (0.0271794)	1.560828* (0.8405969)	0.2583258*** (0.0606291)
LnGDPexp _{it}	1.586775*** (0.0378962)	-.7009453 (0.6302831)	-0.5630524 (0.6021877)
LnGDPimp _{jt}	1.579275*** (0.0408)	-8.696982 (6.846258)	2.791208*** (0.7338368)
LnWdist _{ijt}	-1.952839*** (0.1741904)	-9.929159 (6.766655)	-3.045039*** (0.3473878)
Languagedummy	0.4038666*** (0.1439551)	0.4839758 (3.045944)	1.416392* (0.7602066)
Ftadummy	1.15828*** (0.1282139)	0.9266601 (0.7409332)	-0.1459245 (0.3359682)
Visapolicydummy	0.536257** (0.2421445)	1.702896** (0.5568877)	-0.4843597 (0.3691844)
Islandspaireddummy	1.481082** (0.2260621)	0 (omitted)	-0.6494608 (1.962836)
Commoncolonizerdummy	0.1981119 (0.1296936)	0 (omitted)	-0.5865179** (0.2920626)
Observations	1983	1931	909
R-squared	0.6810	0.1662	0.5143

Note: * 10% significance level; ** 5% significance level; *** 1% significance level.

Source: Authors' estimates.

We also find that having a common language or English as a common language impacts the exports positively in Pacific DMCs. This result is also in sync with intuitive reasoning. A common language helps reduce trade cost through better information availability. Not only do tourists have better understanding of products in the destination countries, the producers (exporters) are also better acquainted with the rules and regulations in the importing countries if both countries have a common language.

Two important variables from our analysis were free trade agreement and visa policy. We find strong positive relation of merchandise exports with both these variables in our model. Free trade agreements continue to be a consistent driver of international trade, and we find a strong positive relationship between having free trade agreements and an increase in exports. Using the formula $100 \cdot (e^{\beta} - 1)$ associated with the interpretation of a log-linear model with dummy variables, the associate coefficient of the FTA dummy implies that having an FTA would lead to around

218% increase in exports. We also find that having a visa-on-arrival or visa-free policy leads to an overall increase in exports. Easier visa policies are an important determinant of tourism destination for international tourists. Visa-on-arrival or visa-free policies help in short notice travels for tourist and business travellers. These also facilitate travel of accompanying spouse, partners, and dependents of business travellers, who are more likely to involve in consuming local goods, familiarizing them with locally produced goods.

Further, we find that countries in the Pacific tend to trade more with island countries, which has a strong positive impact on overall trade for these countries. This could be because of strong familiarity among Pacific DMCs and the relative geographic separation of this region from the rest of the world. Having a common coloniser, however, is not significant among Pacific DMCs (which includes a few countries that have never been colonised).

4.4.2 Results of Robustness Check

IV Regression Model

The results of IV regression model indicate that inbound tourism affects exports via temperature differences. The higher the temperature difference between the home country of the tourist and the Pacific DMC to which the tourist is travelling, the greater the impact on exports, as higher temperature difference may lead to greater tourist inflows to the Pacific DMC. Model 2 indicates that the coefficient of our main variable of investigation, inbound tourism, remains significant, though at a higher significance level (10%). The other important variable, visa policy, also remains significant at a lower significance level (5%). All other variables become insignificant in this model, as it captures the effect of inbound tourism indirectly through the instrument variable of average temperature difference.

Country and Time Fixed Effects Regression Model

The results of the augmented gravity model change when we introduce country fixed effect and time fixed effect to control for multilateral trade resistance. However, the explanatory power of the model remains high, as it explains, overall, more than 51% changes in log of exports through our selected variables. As in the case of the IV regression model, the value of the coefficient of our main variable of investigation, inbound tourism, remains significant once we use country fixed effect and time fixed effect. Therefore, the robustness checks confirm the positive and significant relation between inbound tourism and merchandise exports for Pacific DMCs.

The weighted distance and common language variables also behaved in the same manner as in the model without country fixed effect and time fixed effect. The weighted distance is negatively associated with the log of exports, and having a common language or English as a common language impacts the exports positively in our model with country fixed effect and time fixed effect.

However, some of the other variables have become insignificant. For instance, we find that the GDP of the exporting country has a negative association with the log of exports in this model but is statistically insignificant. Though this result is counter intuitive, this could be due to the low value of Pacific DMCs' GDP compared to their trading partners, making this variable insignificant. Free trade agreement and visa policy variables have also become insignificant though their direction of relation continues to be along the expected lines. This could be because of insignificant changes in these two variables during our period of analysis, making them more prone to be absorbed in the country and time fixed effects. Moreover, existing literature supports the idea that some variables may become insignificant after the introduction of these fixed effects.

5.0 Conclusion and Policy Recommendations

This study finds that tourism inflows have significant interlinkages with the merchandise exports. A 1% increase in inbound tourists is associated with a 0.17% rise in merchandise exports in the Pacific. The robustness check, that takes into account endogeneity and multilateral trade resistance issues, further supports the positive relationship. If international tourists are from countries that enjoy common language with Pacific DMCs and have formed economic partnership through FTAs and easy visa policies, the merchandise exports are further increased.

International tourism, thus, can be viewed as a way to develop other industries such as garments or souvenir-related manufacturing, in Pacific DMCs. These products hold good export potential if they can be customized to the tastes and preferences of international tourists.

Pacific DMCs may also like to focus on products which have local characteristics. These could include artisanal products, handicraft items, specific agricultural or food products, to name a few. However, while developing an export strategy for such products, the emphasis should be on specific markets from which Pacific DMCs receive the largest number of tourists, taking advantage of greater awareness of their products. For example, Pacific DMCs are yet to leverage rising demand and prices of copra and its oil, as they suffer from high shipping cost to Europe (the biggest market) and lack of demand in Australia and New Zealand. By marketing niche products, such as virgin coconut oil, to its tourists, Pacific DMCs can benefit from exporting the same to its tourist source countries. Market research analysis could thus be useful to understand the tastes and preferences of international tourists and accordingly customize locally produced goods for the countries in the greater Asia and Pacific region.

Pacific DMCs should look for regional economic agreements with key tourism source markets or countries that have the potential to become so. The study highlighted that merchandise exports will be higher if international tourists are from countries that enjoy a common language with Pacific DMCs and have formed an economic partnership through FTAs and easy visa policies (such as visa-free arrangement or visa-on-arrival). While currently Australia, New Zealand, and the US form a large share of tourist arrivals in several of Pacific DMCs, Asian countries, such as the People's Republic of China, India, Japan, the Republic of Korea, and others also have large potential. Pacific DMCs should, in fact, forge economic cooperation with these countries through improved regulatory and infrastructural connectivity that will enhance international tourism and their merchandise trade.

In addition, diversifying international tourist source countries to Pacific DMCs will help build economic resilience. For example, most international tourists visiting Fiji from Australia, New Zealand, and the US—the three major markets—make Fiji susceptible to shock in these economies. This dependence on a narrow set of markets raises the vulnerability of Fiji's tourism sector and introduces weaknesses in macroeconomic stability of the country. Proactive government intervention is thus needed to diversify source countries for international tourists to minimize the damage from specific external shocks to both tourism and the other associated sectors to safeguard economic growth and resilience.

Pacific DMCs should work towards adopting and implementing unilateral policies that have positive effects on tourism from both the demand and supply sides. For instance, unilateral policies, such as foreign direct investment policies and investment incentives, can augment the supply of tourism services offerings, whereas easier tourist visa policies, such as visa free access and visa on arrival, help increase demand for tourism services. Higher tourist arrivals would increase merchandise exports for these economies.

Intraregional cooperation for tourism services through the involvement of other stakeholders, such as industry associations, should also be explored. Such cooperation could involve capacity-building, resource sharing, technology upgrading, and knowledge exchange, among others. The Pacific governments should consider cooperation agreements within and outside the region for visa exemption, electronic visa, and visa-on-arrival facilities, easier custom clearances and trade facilitation for their export items if providing these facilities is not universally feasible. Cooperation agreements with transit countries, especially the ones with aviation hubs (e.g., Malaysia, Japan, the Republic of Korea, Thailand, and Singapore) will be useful for economies in the region, since they have limited direct connectivity with other parts of the world. Cooperation can also occur through building stronger transport connectivity and marketing partnerships, which would allow Pacific DMCs to penetrate these countries' local and tourism markets.

Appendix 1: Variables for Augmented Gravity Model and their Data Sources

Variable	Description	Data Source	Intuitive Relation with Dependent Variable
α	Represents the Intercept Term	-	
β 's	Represents the Coefficient Terms	-	
LogExp_{ijt}	Denotes the log of exports from country i to country j at time t (Dependent Variable)	World Integrated Trade Solution	
LogTourinb_{ijt}	Denotes the log of the number of tourist arrivals to country i from country j at time t,	UN World Tourism Organization Database	Positive
LogGdpexp_{it}	Nominal GDP of country i (exporter of goods) at time t	World Bank Databank	Positive
LogGdpimp_{jt}	Nominal GDP of country j (importer of goods) at time t	World Bank Databank	Positive
LogWdist_{ijt}	Distance between countries i and j weighted by the nominal GDPs of the respective countries at time t	Self-estimation based on data taken from sea-distances.org	Negative
Languagedummy	Is a binary variable which is unity if i and j have English as one of their official languages or more than 50% of one of the two country's population speaks English or the two countries have a common language spoken by more than 25% of the population, zero otherwise	Self-estimation based on data from The World Factbook	Positive
FTAdummy	Is a binary variable which is unity if i and j are common members of a regional free-trade agreement or have a bilateral free trade agreement, zero otherwise	Self-estimation based on data from World Trade Organization-Regional Trade Agreement database	Positive
Visapolicydummy	is a binary variable which is unity if either of the two countries offers visa on arrival or visa-free access to the other country's nationals, zero otherwise	Self-estimation	Positive
Islandspaireddummy	is a binary variable that is unity if the exporter and importer are island countries, zero otherwise	Self-estimation	Negative
Commoncolonizerdummy	is a binary variable which is unity if countries in the pair have ever had a common coloniser and zero otherwise	Self-estimation	Positive

GDP = gross domestic product.

Source: Authors' compilation.

Appendix 2: Summary Statistics of Augmented Gravity Model and IV Regression Model

1. Model 1: Augmented Gravity Model

Variable	Obs	Mean	Std. Dev.	Min	Max
logexp	2,068	10.50554	6.261055	0	22.05613
logtourist~d	1,983	6.334157	2.277628	0	12.81386
logg~xporter	2,068	20.24156	1.7024	16.53885	23.93213
logg~mporter	2,068	27.37957	2.363002	17.28453	30.69352
logwdist	2,068	6.570746	.8260146	2.301017	7.692607
language~y	2,068	.4516441	.4977766	0	1
ftadummy	2,068	.2674081	.4427141	0	1
visapolicy~y	2,068	.9124758	.28267	0	1
islandspai~y	2,068	.3244681	.468289	0	1
commoncolo~y	2,068	.4202128	.4937123	0	1

Source: Authors' estimates.

2. Model 2: IV Regression Model

Variable	Obs	Mean	Std. Dev.	Min	Max
logexp	2,068	10.50554	6.261055	0	22.0561
logtourist~d	1,983	6.334157	2.277628	0	12.8139
logg~xporter	2,068	20.24155	1.702399	16.5389	23.9321
logg~mporter	2,068	27.37957	2.363003	17.2845	30.6935
logwdist	2,068	6.570746	.8260146	2.30102	7.69261
language~y	2,068	.4516441	.4977766	0	1
ftadummy	2,068	.2674081	.4427141	0	1
visapolicy~y	2,068	.9124758	.28267	0	1
islandspai~y	2,068	.3244681	.468289	0	1
commoncolo~y	2,068	.4202128	.4937123	0	1
abstempdiff	2,013	13.78676	8.400479	.01	33.2

Source: Authors' estimates.

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Tourism Inflow Interlinkages with Merchandise Exports

An Augmented Gravity Analysis for the Pacific

This paper analyzes tourist inflows as a determinant of merchandise exports for the Pacific. It finds that inbound tourism to Pacific developing member countries significantly increases merchandise exports from these economies. Exports are further boosted if international tourists come from countries with which Pacific developing member countries have a shared language, formed an economic partnership through free trade agreements, and have easy visa policies. The paper recommends that inbound tourism to the Pacific is leveraged to diversify economic activities and develop industries, such as garments or souvenir-related manufacturing.

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