

# International tourism and trade in Mexico: A Granger causality test (2012- 2020)



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**Abstract** Limited information is available on the factors that impact the flow of international tourists to Mexico, a top global tourist destination in the 21st century. Our study utilizes the Granger causality test in vector autoregressive (VAR) models to examine the potential causal relationship between international trade and international tourism flows with Mexico's key travel partners from 2012 to 2020. Analysis of data from trade balance and foreign tourist visits to Mexico reveals a Granger causality linking trade balance growth to increased international tourist arrivals from the United States, Argentina, and Italy. Conversely, in the case of Canada, growth in tourist visits influences the trade balance between the two countries. No significant Granger-causality was found for the United Kingdom, Colombia, Spain, Brazil, France, and Germany. These results have important implications for the development of public tourism policies focused on addressing challenges related to Sustainable Development Goals (SDGs).

**Keywords:** industrial policy, international tourism arrivals, balance of trade, cointegration, Mexico

## 1. Introduction

The tourism and trade sectors have experienced significant growth, approaching the levels observed prior to the pandemic. According to the United Nations World Tourism Organization (UNWTO) barometer (2023), it is projected that international arrivals will reach a total of 1.3 billion in 2023, showing a 33% increase compared to 2022 and nearly reaching 90% of the pre-pandemic levels. Additionally, international tourism receipts have the potential to reach USD 1.4 trillion in 2023, accounting for approximately 93% of the USD 1.5 trillion earned by destinations in 2019. The World Trade Organization (2023) has projected a growth rate of 3.3% for global merchandise trade volume in 2024, while maintaining a steady Gross Domestic Product (GDP) growth of 2.5%. This anticipated increase surpasses the forecasted expansion of the global gross domestic product.

In recent years, there has been a growing emphasis on investigating the relationship between international trade and tourism. The impact of trade, including both imports and exports, on the tourist demand function is often overlooked despite the interdependent relationship between trade and travel in various countries. Business travel plays a significant role in international tourism between China and United States (Kullenrdan and Wilson, 2000). Research reveals that in China, business travelers made up 55% of the total inbound foreign tourists (Shan and Wilson, 2001). Exports drive business travelers, leading to an increase in business trips that improve the flow of exports and imports. Successful business trips subsequently boost imports in following periods (Santana-Gallego et al., 2010). This discovery of short-term causality between exports and tourist arrivals emphasizes the one-way relationship in which exports drive tourist arrivals, linking trade and tourism. Ultimately, international trade not only stimulates business trips but also enhances the appeal of destinations by offering a wider range of products.

The commonly utilized methods for this analysis are cointegration and Granger causality test to VAR models (Fry et al., 2010). In Vector Autoregression (VAR) models, each dependent variable is influenced by its own historical values as well as the historical values of related variables. These models assume that all variables are endogenous, enabling a more precise portrayal of the interrelationships within the data under analysis. Previous studies have primarily focused on developed countries, neglecting the examination of developing countries. Addressing this gap is particularly crucial, especially in countries like Mexico, which has successfully established itself as one of the leading global destinations. Therefore, the study and understanding of the determinants of the arrival of visitors to the country is urgent to create specific lines of action to successfully face the challenges posed by SDGs.

The most significant flow of international tourists to Mexico during the study period originated from the United States, Canada, the United Kingdom, Colombia, Argentina, Spain, Brazil, France, Germany, and Italy. The purpose of this paper is to investigate whether there is evidence of a Granger-causality between the balance of trade and the flow of foreign tourists that visited Mexico during the period 2012 to 2020. This paper seeks to gather evidence in order to address the following question:



Does trade promote tourism and does tourism consequently stimulate trade? The objective is to evaluate if the rise in tourists from these nations visiting Mexico has an impact on the growth rate of Mexico's balance of trade with these countries, and vice versa, within the period of 2012 to 2020—currently the only monthly time series available.

We found a Granger-causality between the growth rate of balance of trade and the growth rate of international tourists visiting Mexico from the United States, Argentina, and Italy. In other words, in these three cases, the increase in the balance of trade with these countries can serve as a potential indicator to predict the growth rate of international visitors from these countries. In the case of Canada, the growth rate of arrival of tourists Granger-causes the rate of growth in the balance of trade between this country with Mexico. These findings validate the hypothesis proposed by Kulendran and Wilson (2000) in the context of Australia and support the conclusions drawn by Fry et al. (2010) in relation to South Africa. We did not find any Granger-causality for United Kingdom, Colombia, Spain, Brazil, France, and Germany. Taking into account trade as a factor in determining tourist demand is crucial, as there is a potential for mutual reinforcement between international trade and tourism, creating feedback loops between these two industries. Failing to recognize this connection could lead to inaccurate assessments and insufficient evaluations of the factors influencing tourist demand.

These findings are of particular interest considering its role in formulating tailored policies for each country and align with the Sustainable Development Goals (SDGs) outlined by the United Nations (Hall, 2021). Comprising 17 global objectives, the SDGs target economic, social, and environmental challenges on a global scale, ultimately fostering sustainable development. These goals were integrated into the 2030 Agenda for Sustainable Development in September 2015. The outcomes of this study can aid stakeholders in preparing for necessary adjustments to meet these objectives.

This paper is divided in four sections. Section one highlights tourism's significance to the global economy, and its impact on Mexico over the past decade. The second section presents the properties of Granger models and the data set. The model and results from various Granger-causality tests are presented in the third section. The conclusions appear in the final section.

### *1.1. The importance of tourism in the global economy*

Tourism contributes to the economy by generating jobs (Ardahaey, 2011). In the second decade of the 21st century, the tourism industry had an exponential growth, generating 1 out of every ten jobs worldwide. In developing countries, the expansion of tourism in rural regions not only creates employment opportunities, but it also generates growth opportunities for women, which has a positive impact on gender inequality. Tourism also promotes investment, which makes easier the regularization of the use of land.

The progress and growth of international trade allows the development of the national industry, reaching greater economies of scale and exploiting comparative advantages (Caballero, 2000). Consequently, individuals from these countries are expected to enjoy a higher per capita income, which increases both the probability and the possibility of traveling. Tourism ranks third in international trade. In fact, countries that open their borders to a substantial number of trading partners eventually increase the flow of international tourists visiting them, and vice versa. In this way, tourism has a direct impact on the GDP.

Tourism also propels economic development through spending on souvenirs, clothing, and gifts. It is estimated that these purchases represent between 15 and 20 percent of total spending. This improves the terms of trade, and therefore it has the effect of increasing well-being. In general, the growth rate of countries that specialize in tourism is higher than those that choose to develop other activities (Sequeira and Maçãs-Nunes, 2008). During the second decade of the 21st century, tourism was a key factor for growth and economic development in many countries (Tang and Tan, 2015a).

### *1.2. Mexico's tourism industry*

During the period from 2007 to 2013 only between 14.1 and 15 percent of visitors to Mexico (both national and foreign) did so for work or business reasons. From 2015 to the beginning of 2020, the number of tourist arrivals to Mexico doubled with the arrival of 41.5 million travellers. Although Mexico's tourist success during this period was highly dependent on foreign tourism, the importance of domestic tourism is not negligible, and it is distributed across the entire national territory (Gómez and Barrón, 2019). The flow of international visitors to Mexico is mainly directed to beach destinations as it has been shown by the number of international air arrivals: Cancun, Los Cabos, Puerto Vallarta, Cozumel and Mazatlan, where the exceptions are Mexico City, Guadalajara, and Monterrey (Datatur, 2020a). In 2016, tourism represented more than 8 points of GDP and contributed with 8.7 percent of national employment (INEGI, 2019).

Sánchez-Carrera, Brida and Risso (2008) show that a 100 percent increase in tourism spending causes an increase of almost 70 percent in Mexico's real GDP. Wilson (2008a) finds that the creation of jobs in this sector reduced income inequality with a gender approach because the main tourist destinations provide women with multiple jobs in the service sector. In addition, literature shows that tourism in Mexico has a multi-sector and multiplier effect. In other words, the arrival of tourists in high volumes causes an increase in the demand for goods and services, which makes easier the growth of other productive sectors.

Altés (2008) proves that tourism in Mexico has a positive impact on social and economic well-being through different modalities such as increasing disposable income per capita, the rise in the cultural and professional level of the population, the expansion of the construction sector, the basic industrialization of the economy, and the suppression of migratory flows abroad. Wilson (2008b) also points out as achievements of tourism development in Mexico the diversion of internal migrants to growth poles outside major cities and the increase of foreign currency exchange –in addition to the increase in employment opportunities.

Many authors emphasize the importance of tourism for Mexico, while Gómez and Barrón (2019) emphasize that tourists have a direct and positive impact on the generation of touristic employment within Mexico. Sánchez-Carrera, Brida and Risso (2008) finds a direct relationship between tourism and economic growth in Mexico. Most of the literature on tourism in Mexico deals with the benefits and contributions of this sector to the economic growth of the country (Faber and Gaubert, 2019), but little has been said about the relationship between international tourism and trade.

## 2. Materials and Methods

The database used for this study contains two time series in a time frame from January 2012 to September 2020. The first one measures the monthly growth rate of international visitors by air and by nationality (tcti) (Datatur, 2020b). The second is the monthly growth rate of the balance of trade with each country expressed in thousands of dollars (tcbc) (SIE, 2020). The database includes Mexico's most important travel partners throughout the research period: 80 per cent of the visitors who entered Mexico came from the United States (66%) and Canada (14%). The remaining 20 per cent came from the United Kingdom (4%), Colombia (3%), Argentina (3%), Spain (3%), Brazil (2%), France (2%), Germany (2%) and Italy (1%).

### 2.1. Vector Auto Regressive (VAR) Models

Granger-causality models are based on autoregressive vector systems (VAR). A VAR model is a regression of systems, it means that there is more than one dependent variable. This system makes each endogenous variable a function of its past and the past of other variables of a similar nature (Londoño, 2005). This regression of systems is a mixture of univariate time series models of simultaneous equations (Brooks, 2019).

As opposed to univariate time series and simultaneous equation models, VAR models do not require to specify whether the variables are endogenous or exogenous, since in VAR models all variables are endogenous. In addition, they allow the value of a variable to depend on more than just its own lags or combinations of white noise terms. In this way, it is possible to capture more characteristics of the worked data. VAR models tend to be more exact in the forecast of some variables than other structural specification models (Brooks, 2019). Finally, VAR models use little theoretical information about the relationships between variables at the time of model specification (Brooks, 2019). In the case of the study of the tourism industry in Mexico this characteristic becomes an advantage since little has been analysed with this methodology.

### 2.2. Granger-causality models

Causality assumes a cause-and-effect relationship. In other words, variation in one variable causes variation in another variable (Brooks, 2019). It is important to note that correlation does not necessarily mean a causality between variables (Luque, 2016). Granger defines causality when there is a correlation between the present value of one variable and the past values of other. This doesn't necessarily imply that the movements of one variable cause the movements of another in the same period (Brooks, 2019). Therefore, it can be said that Granger-causality is a lagged correlation, in such a manner that if one series precedes another, the first can be expected to cause the second (Khan et al., 2005).

Thus, a Granger-causality test seeks to prove if the changes in the stochastic  $y_1$  variable causes changes in another stochastic variable  $y_2$ . If that is the case, the past values of  $y_1$  (lags) must be significant for the  $y_2$  equation. Therefore, it can be said that  $y_1$  Granger-causes  $y_2$ . In this situation, it is said that there is a unidirectional causality from  $y_1$  to  $y_2$ . On the other hand, when  $y_2$  causes changes to  $y_1$ , the lags of  $y_2$  must be significant for the  $y_1$  equation. If both sets of lags are significant, it can be said that there is a bidirectional causality. When  $y_1$  Granger-causes  $y_2$ , but  $y_2$  does not Granger-causes  $y_1$ , we can affirm that the  $y_1$  variable is strongly exogenous in the equation for  $y_2$ . Finally, the variables will be independent of each other when no set of lags is statistically significant in the equation of the other variable. It is important to note that this type of evidence only allows the acceptance or rejection of direct causality. Granger-causality depends entirely on the correct selection of variables. Nevertheless, it is not possible to reject the existence of indirect causality because of the omission in the analysis of other relevant variables.

### 2.3. Granger applications for tourism across the world

Different studies have used the Granger-causality test to set up relationships that can help to improve the understanding of different types of economic activities. Particularly in the touristic context, this test has been extremely valuable to analyse the relationship between the influence of tourism and the economic growth as has been shown below.

Asia is the region that most authors have studied using the Granger-causality test. Tang and Tan (2013) find that even though economic growth in Malaysia is cointegrated with 12 selected tourism markets, only for 8 of them tourism-led growth hypothesis is valid and stable. Wang et al. (2012) investigate the relationship between domestic tourism of China and the economic growth of the country. They conclude that there is a two-way causality between these variables. In other words, the development of the touristic industry Granger-causes economic growth and vice versa.

Chen et al. (2015) analyses the case of Korea and examines whether the arrival of international tourists, the balance of trade and the GDP growth increase the probability that the tourism lifecycle will remain in high-growth regime. These results show that the arrival of tourists and the balance of trade Granger-cause the growth of the lifecycle in Korea. Taiwan is studied by Yu-Chi (2018), who evaluates the growth hypothesis driven by tourism using the number of arrivals of international tourists, international tourist spending, and real GDP. This research proves a unidirectional relationship between tourism and economic growth, which strengthens the hypothesis of economic growth driven by tourism.

Aslan (2014) uses a Granger-causality test to study a panel data of Mediterranean countries for the 1995 to 2010 period. Aslan proves that Portugal presents a two-way Granger-causality between touristic development and economic growth. However, he finds a one-way Granger-causality relationship between tourism development and economic growth in countries like Bulgaria, Cyprus, Croatia, Spain, Greece, Italy, and Tunisia.

Using a logarithmic transformation of real GDP, Bilen, Yilanci and Eryüzlü (2017) study 12 Mediterranean countries (Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Malta, Portugal, Spain, Tunisia and Turkey). The authors find two-way Granger-causality with the development of tourism activity in all the analysed countries during 1995 to 2012.

For South Africa, Akinboade and Braimoh (2010) analyse income derived from international tourism, the real effective exchange rate, and exports. The authors find out a Granger-causality of these variables and the real GDP of that country. Several emerging economies are analysed by Sokhanvar et al. (2018) by studying the Granger-causality relationships between revenues as a percentage of GDP and economic growth. Of the 16 countries evaluated, in the case of Brazil, the Philippines and Mexico they find a one-way Granger-causality relationship between international tourism income and economic growth. On the other hand, in China, India, Malaysia, Peru and Indonesia the relationship is inverse. In other words, economic growth is what drives tourism. No causality was found in seven countries (Russia, South Africa, Poland, Hungary, Colombia, Thailand, and Turkey), and in the case of Chile a bidirectional Granger-causality was detected. In contrast to these results, Brida and Risso (2009) find a unidirectional Granger-causality from tourism spending and the exchange rate towards real GDP.

Lionetti and González (2012) analyse the contribution of the touristic sector to economic growth in Argentina, Chile, Mexico, Nicaragua, the Dominican Republic, and Venezuela. They do not find Granger-causality in the long term for any of these countries. However, in the case of Argentina and Mexico, they find a negative relationship in the short term. In other words, economic growth is responsible for tourism development. However, in the case of Chile, Nicaragua, Venezuela and the Dominican Republic, the Granger-causality turns out to be bidirectional.

As it has been reviewed, available literature on the applications of the Granger-causality methodology indicates it has mainly been applied to analyse the relationship between the tourism activity and the economic growth. There are few exceptions. Kulendran and Wilson (2000) analyzed the correlation between tourism from the United States and trade in Australia. They discovered a two-way Granger causality. However, they found a one-way Granger causality relationship between Japan's travelers and Australia's trade. Additionally, their analysis revealed one-way causality between trade from the United Kingdom and tourism in Australia. Shan and Wilson (2001) study the relationship between international tourism and international trade in China, revealing a two-way causality between the two factors in the case of United States, Japan, Australia and United Kingdom. Khan, Toh, and Chua (2005) study the case of Singapore and its four main trading partners: Australia, United States, United Kingdom and Japan. The authors find only a Granger causality between Japan's trade and business travelers coming to Singapore. Fry et al. (2010) explore the relationship between trade and tourism in South Africa. The study found that tourism Granger causes trade in the case of the United States, while total trade leads to tourism in Australia, Netherlands and the United Kingdom.

Granger-causality varies across regions and eventually among countries within the same region. Currently, there is no evidence that potential causal relationship between the trade balance and the flow of foreign tourists has been conducted in the case of Mexico using the Grange causality test. As a contribution to the scarce literature on tourism in this country, in the following section we present the elaboration of a Granger-causality test for the case of Mexico during the 2012 to 2020 period.

### 3. Results and discussion

The first step in Granger-causality testing is to verify that both series are stationary using the augmented Dickey-Fuller test. Next, the number of lags included in each country's VAR model was determined using the Akaike Information Criteria (AIC). See Table 1.

Once the seasonality of the time series has been proven, we build the VAR model to evaluate the Granger-causality for each country. Specifically, two regressions are estimated. In this way, the bivariate VAR model consists of the growth rate of international tourists ( $y_{1t}$ ) and the balance of trade ( $y_{2t}$ ) whose current values depend on different combinations of their lagged values and the residual term as shown below:

**Table 1** Number of Optimal Lags.

Country	Optimal lags number
United States	4
Canada	2
United Kingdom	2
Colombia	4
Argentina	2
Spain	2
Brazil	4
France	3
Germany	2
Italy	3

Source: Own elaboration.

$$y_{1t} = \beta_{10} + \beta_{11}y_{1t-1} + \dots + \beta_{1k}y_{1t-k} + \alpha_{11}y_{2t-1} + \dots + \alpha_{1k}y_{2t-k} + u_{1t} \tag{1}$$

$$y_{2t} = \beta_{20} + \beta_{21}y_{2t-1} + \dots + \beta_{2k}y_{2t-k} + \alpha_{21}y_{1t-1} + \dots + \alpha_{2k}y_{1t-k} + u_{2t} \tag{2}$$

Where  $u_{it}$  is a white noise term with  $E(u_{it}) = 0, (i= 1,2), E(u_{1t} u_{2t}) = 0$

Once the VAR approach for each country is made, we test the serial correlation among residuals. The null hypothesis is that there is no autocorrelation problem. Consequently, the aim is not to reject the null hypothesis, otherwise the model would be miss-specified. This test uses a Lagrange multiplier statistic. Table 2 shows that 8 of the ten countries do not show autocorrelation. The only exceptions are Colombia and Brazil. Further on, we will discuss why these results are not of concern.

**Table 2** Serial Correlation Test on Residuals.

Country	Optimal lags number	Ho	Chi2	P Value	Decision
United States	4	No serial correlation problem	2.3245	0.67631	Do not reject
Canada	2	No serial correlation problem	7.0693	0.13227	Do not reject
United Kingdom	2	No serial correlation problem	8.3333	0.0801	Do not reject
Colombia	4	No serial correlation problem	13.7174	0.00825	Reject
Argentina	2	No serial correlation problem	1.3587	0.85135	Do not reject
Spain	2	No serial correlation problem	1.6537	0.7991	Do not reject
Brazil	4	No serial correlation problem	44.997	0.0000	Reject
France	3	No serial correlation problem	3.077	0.54502	Do not reject
Germany	2	No serial correlation problem	2.7822	0.59491	Do not reject
Italy	3	No serial correlation problem	9.1352	0.05781	Do not reject

Source: Own elaboration.

Next, we test stability for each VAR. The aim is not to reject the null hypothesis, which sets out the stability of the model. It is important to underline that the null hypothesis is rejected if one of the modules is greater than 1. The results prove that the VAR models proposed meet the stability conditions. In other words, we do not reject the null hypothesis for any country. Finally, the normality of the residuals is evaluated by using the Jarque-Bera test (skewness and kurtosis test). All the models presented normality.

Table 3 shows the results of the Granger-causality test between the number of foreign visitors and international trade. As it can be seen, two regressions are estimated for each country. The null hypothesis of the first regression is whether growth rate of international tourists does not Granger-cause an increase in the growth rate of the balance of trade (denoted as  $tcti \neq \Rightarrow tcbc$ ), while the second regression proves the inverse relationship. If both hypotheses are rejected, we can say that there is evidence to assert that there is bidirectional causality.

The United States, Argentina, and Italy present statistical evidence of a Granger-causality between the growth rate of the balance of trade and an increase in the growth rate of tourist arrivals to Mexico with a level of significance of 90 percent. In other words, the growth in the balance of trade is an essential factor for the growth of the arrival of American, Argentines and Italian tourists to the country. These findings indicate that the removal of trade barriers could have a positive impact on the growth of the tourism industry. This conclusion is consistent with the research of Kulendran and Wilson (2000), who



established a connection between trade in the United Kingdom and travel in Australia. Additionally, the results confirm that trade with Australia, Netherlands, and United Kingdom contributes to tourism in South Africa, as concluded by Fry et al. (2010).

**Table 3** Granger-causality test.

Country	Lag	H0	Chi2	P Value	Decision	Significance
United States	4	tcti $\neq$ >tcbc	0.18817	0.664	Not Reject	33.60%
		tcbc $\neq$ >ttcti	3.0428	0.081	Reject	91.60%
Canada	2	tcti $\neq$ >tcbc	1.7579	0.185	Not rejected	81.50%
		tcbc $\neq$ >ttcti	0.07928	0.778	Not rejected	22.20%
United Kingdom	2	tcti $\neq$ >tcbc	0.08445	0.771	Not rejected	22.90%
		tcbc $\neq$ >ttcti	0.44898	0.503	Not rejected	49.70%
Colombia	4	tcti $\neq$ >tcbc	0.80586	0.369	Not rejected	63.10%
		tcbc $\neq$ >ttcti	2.5204	0.112	Not rejected	88.80%
Argentina	2	tcti $\neq$ >tcbc	0.81552	0.366	Not rejected	63.40%
		tcbc $\neq$ >ttcti	8.699	0.003	Reject	99.70%
Spain	2	tcti $\neq$ >tcbc	0.0026	0.959	Not rejected	4.10%
		tcbc $\neq$ >ttcti	0.61469	0.433	Not rejected	56.70%
Brazil	4	tcti $\neq$ >tcbc	0.09289	0.761	Not rejected	23.90%
		tcbc $\neq$ >ttcti	0.99864	0.318	Not rejected	68.20%
France	3	tcti $\neq$ >tcbc	0.30315	0.582	Not rejected	41.80%
		tcbc $\neq$ >ttcti	0.54999	0.458	Not rejected	54.20%
Germany	2	tcti $\neq$ >tcbc	0.5748	0.448	Not rejected	55.20%
		tcbc $\neq$ >ttcti	0.94132	0.332	Not rejected	66.80%
Italy	3	tcti $\neq$ >tcbc	0.00657	0.935	Not rejected	6.50%
		tcbc $\neq$ >ttcti	4.6156	0.032	Reject	96.80%

Source: Own elaboration.

In the case of Canada, with a significance level of 80 percent, an increase in the growth rate of tourist arrivals Granger-causes an increase in the growth rate of the balance of trade with Mexico, but Canada’s trade of balance with Mexico has a negative sign. This can be explained since to accommodate international tourists, in many cases, imports of goods such as alcoholic beverages and high-quality food are often increased. One possible explanation is that business travel may result in increased import purchases. This observation is consistent with the study carried out by Kulendran and Wilson (2000), which revealed a significant Granger causality between Japanese tourists and business trade in Australia. Moreover, this outcome reinforces the Granger causality between American tourists and trade in Southern Africa (Fry et al., 2010). For the remaining six countries we find no Granger-causality. It is important to underline the cases of Colombia and Brazil, which showed autocorrelation in their residuals. However, this fact is not of concern since it is an overestimation of the p-value that does not affect in a significant way the result of the causality test.

Summarizing, the results presented in this research show that, in Mexico, Granger-causality of the growth rate in trade towards the growth rate in the number of international tourist arrivals occurs mostly in countries that have a positive balance of trade with Mexico (United States, Argentina and Italy), while the case of Canada, there is a one-way Granger causality from Canadian tourist arrivals in Mexico to the balance of trade with this country. This result is consistent with the findings of Kulendran and Wilson (2000) for Australia, and the results reported by Fry et al. (2010) for South Africa.

The expansion and growth of the international trade of Mexico has allowed the evolution of the national industry, giving rise to greater economies of scale, as well as the development of comparative advantages. However, the findings showcased in this study are of particular interest considering their role in formulating tailored policies for each country and aligning with the SDGs outlined by the United Nations.

**4. Conclusions**

Over the past decade, Mexico has emerged as one of the leading global tourist destinations. However, there has been little research conducted regarding the specific factors that contribute to the increasing number of tourists in the country. Our study aims to examine whether there is a Granger causality between the growth rate of tourist arrivals from the top ten countries visiting Mexico by air between 2012 and 2020, and the subsequent increase in the balance of trade for these countries, and vice versa.



The countries that have been analyzed include the United States, Canada, the United Kingdom, Colombia, Argentina, Spain, Brazil, France, Germany, and Italy. The results indicate that in Mexico, there is a causal relationship known as Granger-causality observed in 40 percent of the countries examined. This means that there is a confirmed connection between the growth rate of the balance of trade and the growth rate of international tourists from the United States, Argentina, and Italy. Therefore, the trend of international trade with these countries can provide valuable information for predicting the growth rate of visitors from these locations. Examining trade as a factor influencing tourist demand holds significance as international trade and tourism have the potential to mutually benefit each other, creating possible feedback loops between the two industries. Failure to consider this interconnection could lead to skewed evaluations and incomplete understanding of the factors influencing tourist demand. In the case of Canada, there is a causal relationship between tourism and the balance of trade, suggesting that tourist access is cointegrated to imports from that country.

The diversity in the causality results suggests that there are various trading dynamics at play between Mexico and these ten countries. However, the Granger-causality between the balance of trade with the United States and the flow of American tourists to Mexico underscores the economic significance of tourism flow and bilateral trade in fostering Mexico's economic expansion. The numbers prove the commercial value of this relationship, with 80% of Mexico's exports reaching the United States in 2015. Furthermore, Mexico ranked as the United States' third largest trading ally, accounting for 14% of their overall trade.

Based on the findings of this research it is reasonable to anticipate significant positive effects on the economic development of Mexico if tailored policies for each country are developed and align with the SDGs to strengthen ties with these nations. Further research should aim to address the limitations of this study by creating a panel data set to estimate a dynamic model. This avenue can be explored once the necessary additional information is provided by the Mexican authorities.

### Ethical considerations

Not applicable.

### Conflict of Interest

The author declares no conflicts of interest.

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