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## Tourism demand for Mexico and Uruguay

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### Abstract

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Tourism is frequently viewed as an important engine for the economic growth and country's development. In Mexico, the domestic trips have become a notable feature but the main tourism exports are from international travelers. In 2014 Mexico was the 10th most attractive country for travelers and 58.3% came from the United States. For Uruguay, total yearly tourists represent about 90% of its population, and Argentinean tourists represent nearly 60% of this total and historically they have been the main visitors. Tourist activities have a great impact on both economies, and in this paper, we try to measure tourism demand comparing Mexico and Uruguay, two very different countries, but for both tourism is an important industry, generating employment and income. Therefore, it is central to analyze the determinants behind tourism demand. We study the relationship between the number of US tourists for Mexico and Argentinean tourists for Uruguay, analyzing the relationship with the income and the real exchange rate (RER) of each country. We studied long-run cointegration vectors between variables, following Johansen methodology. We found one cointegration relationship for each country, through Vector error correction models (VECM). We found an income-elasticity greater than 2 for American tourists in Mexico, and near 3 for Argentinean tourists in Uruguay. Bilateral RER also were significant in both models.

Keywords: tourism demand, cointegration, real exchange rate.

JEL Classification: C32, F14, F41.

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## Demanda turística de México y Uruguay

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### Resumen

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El turismo es frecuentemente visto como un importante motor para el crecimiento y el desarrollo económico de los países. En México, el turismo interno es muy importante, pero los principales ingresos provienen del turismo internacional. En 2014 México fue el 10<sup>o</sup> país más atractivo para los viajeros y el 58,3% entre los de Estados Unidos. Para Uruguay, los turistas anuales totales representan alrededor del 90% de su población, y los turistas argentinos representan casi el 60% del total, los que históricamente han sido los principales visitantes. Las actividades turísticas tienen un gran impacto en ambas economías, y en este artículo se intenta de medir la demanda turística para México y Uruguay, dos países muy diferentes, pero en ambos el turismo es una importante industria, generadora de empleo y de ingresos. Por lo tanto, es muy importante analizar los determinantes detrás de la demanda turística. Aquí se analiza la relación entre el número de turistas de Estados Unidos que visitaron México y los turistas argentinos que visitaron Uruguay, para ambos países en función del ingreso del país emisor y del tipo de cambio real bilateral (TCR) entre ambos países. Para ello se intenta encontrar vectores de cointegración de largo plazo entre las variables, siguiendo la metodología de Johansen. Se encontró una relación de cointegración para cada país, a través de modelos de corrección de error (VECM). La elasticidad-ingreso encontrada es superior a 2 para los turistas estadounidenses en México, y cerca de 3 para los turistas argentinos en Uruguay. El TCR bilateral también resultó significativo en ambos modelos.

Palabras clave: demanda de turismo, cointegración, tipo de cambio real

Código JEL: C32, F14, F41

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## 1. Introduction

Tourism is frequently viewed as an important engine for the economic growth and country's development (Brida&Risso, 2009; Tang & Tan, 2013; Schubert, Brida, &Risso, 2011; WTTC<sup>1</sup>, 2011; Desplas, 2010). Tourism mobility is increasing over time and space, allowing increasing destination income, employment, foreign currencies earnings, and balanced balances of payments. Experts argue that the tourism industry continues to be one of the world's largest sectors with a crucial impact in the economic welfare of local populations, the entrepreneurship activity, the direct and indirect tourists' spending due to the multiplier effect. In addition, recently, the tourism-growth literature explains that tourism is perceived in many regions as a crucial source of their own expansion and development. For example, in developing countries (Ghimire, 2013); Malaysia (Tang & Tan, 2013); Pakistan (Adnan & Ali, 2013); Cyprus, Latvia and Slovakia, (Chou, 2013); Singapore (Timothy, 2014); Hong Kong (HK Tourism Board, 2014); China (Chon, Pine, Lam, & Zhang, 2013). In other places like the Mediterranean countries (Tugcu, 2014); the Latin-American countries (Peterson, Cardenas, &Harrill, 2014); Mexico (UNTWO<sup>2</sup>, 2014b); the USA (White House, 2014); and the European Countries in general (Costa, Panyik, &Buhalis, 2014) among others. Tourism is also more critical in a resource-poor environment, such as in small islands destinations like Aruba (Ridderstaat, Croes& Nijkamp, 2014).

Over the last decades and despite economic, security or health crisis, tourism experienced continued growth, innovation and diversification, becoming "one of the largest and fastest-growing economic sectors in the world from 25 million in 1950, to 278 million in 1980, 528 million in 1995, 1,035 million in 2012, and 1,087 million in 2013" (UNWTO, 2014b).

According to UNWTO (2014a and 2014b), despite crisis and health situations international tourism expansion continued to be substantial in 2013 and has generated growth all over the world, assessing again the contribution tourism makes to social and economic development. This strong key driver of socio-economic and commercial development creates export revenues, infrastructure investments, jobs' creation and small businesses' generation. The current tourism's situation remains as follows for the entire 2013 representing:

- 9% of total GDP including the direct, indirect and induced impact in the economy,
- 1 in 11 jobs at an international level,
- US\$ 1.4 trillion in exports and 6% of the world exports,
- 1,087 million in 2013 (+52 million),
- 5 to 6 billion domestic tourists,
- Increase of investment in infrastructure,
- New destinations and flights.

For the coming years (towards 2030), UNWTO (2011) displays the existence of a solid potential for more expansion highlighting that:

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<sup>1</sup> World Travel and Tourism Council.

<sup>2</sup>United Nations World Tourism Organization.

- Global growth in international tourists' arrivals will go on at a weaker rate, from 4.2% per year (1980–2020) to 3.3% (2010–2030), international tourist arrivals worldwide reaching 1.8 billion by 2030,
- Towards 2030, arrivals in emerging countries (+4.4% a year) are expected to rise twice the rate of advanced destinations' ones (+2.2% a year).
- The market share of emerging economies increased from 30% in 1980 to 47% in 2012, and it is expected to reach 57% by 2030, equivalent to over one billion international tourist arrivals.

Sánchez, Pulido & Cárdenas (2013) assess that tourism is expected to generate over a horizon of ten years, 11.3 % of the world GDP and 8.3% of the employment. The expected expansion of the tourism sector towards 2030 is a result of four factors regarding UNWTO (2011):

- The increase (even marginal) of travelers is represented by a substantial amount of tourists because the calculation volume base is higher.
- The GDP growth will be strong but lower especially in international arrivals. It is expected to be also more sustainable and inclusive to local population.
- The elasticity of travels to GDP will decrease because trips are not considered anymore as a luxury service but a superior service, part of the new consumer purchase's behavior.
- Despite that the transportation costs are rising again after some decades falling down, they still will represent a growth in arrivals number.

In the USA, many more American consumers from middle class traveled inside the region (Ghimire, 2013), particularly in Mexico. With 120 million inhabitants, 12,000 km of coastline (along the Pacific and Atlantic oceans) and a strong diversity of climates, domestic trips in Mexico have become a notable feature. Nevertheless, the main tourism exports are from international travelers for who Mexico was the 10<sup>th</sup> country more attractive in 2014 and the 9<sup>th</sup> in 2015. In descending order, the international arrivals (by plane) in Mexico in the first 8 months of 2014, correspond to the following nationalities and market share: USA (58.3%), Canada (12.9%), United Kingdom (3.1%), Brazil (2.1%), Colombia (1.9%), Spain (1.8%), Argentina (1.7%), France (1.4%), Germany (1.3%) and Italy (1.1%). The USA are remaining in the first place as the main outbound tourism for Mexico with an increase of 13.6% upon 2013 because of its economic recovery (CNET<sup>3</sup>, 2014). The travel from the USA to Mexico is specially oriented to strength family and community ties, coinciding with the celebration of a saint day, regional fairs, Eastern or Christmas seasons (Ghimire, 2013).

In 2015, more than 32 million tourists visited Mexico (+ nearly 10%), that represent a high growth driven by the US demand in spite of a “warning” that implores U.S. citizens to lower their personal profiles for security issues. Mexico's tourism industry boomed in 2015: of the total of international passengers arrived in the country, 57.3% were US citizens, confirming that its big neighbor remains its main tourist market. Furthermore, out of the US tourists who traveled abroad, 18% made it to Mexico, a figure that shows a steady increase in market share to Mexico from US travelers and a historical record in term of numbers. Even more, Mexico Tourism Secretary plans to reach 20% in the next future. In 2015, US travelers were still the tourists that most visited Mexico for both recreational and business tourism. Almost 9 million of

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<sup>3</sup>NationalTourismEntrepreneurBoard (Consejo Nacional Empresarial Turístico).

US tourists entered the country by air in 2015, representing 17.8% of the total (SECTUR, 2016). According to Meré (2016), the Mexican airport that received more Americans in 2015 was Cancun, with 3 433 500 passengers, followed by Mexico City with 1 240 000 passengers. Finally, in term of high-end and luxury sector, Mexico ranks number one in the top 10 ranking, followed by Canada, Australia, New Zealand, United Kingdom, South Africa and India, Chile and China. This is especially accurate for the US VIP tourists that appreciate the Mexican hospitality supply (SECTUR, 2016).

Consequently, for the tourism Minister De la Madrid, "there is no doubt that the most important market for us are the United States, followed by Canada" (SECTUR, 2016).

According SECTUR (2016), those results are due to:

- An exchange rate that has been more favorable to US tourists in the past year.
- Mexico, being a close destination is also cheaper for US tourists representing a competitive advantage in the consumers' decision making process for foreign countries.
- Mexico has a variety of attractive beaches in the Caribbean and Pacific Ocean areas, colonial cities, shopping and natural places such as mountains, canyons, deserts and countryside areas.
- A better flights connectivity has been developed in the past years by the federal and states governments.
- An increased investment in the Mexican tourism sector attracted by both private and public sectors, due to strong international strategies of promotions especially aimed to the United States.
- The perception from the American citizens that Mexico has a political stability and an improved tourist's safety policy that give them tranquility to travel.
- The Mexican airports infrastructure has been strongly improved allowing the arrival of more foreign citizens and satisfying more demanding requirements.

To boost the growth of the tourism industry in Mexico and contribute to the diversification of markets, the Mexican federal government will allocate 867 million 278 thousand pesos to the promotion of the country in 2016, the largest number in at least a decade (+ 3.1% from 2014) (Martinez, 2016).

On the other hand, Uruguay is located in the south of South America, between two big neighbors: Argentina and Brazil, and with a very peculiar geographic and political structure that was defined by its history and afterwards development.

Uruguay has 3.3 million inhabitants, with 700 km of coastline over the Rio de la Plata, and a temperate climate. Argentinean tourists have historically been its main visitors, particularly in the main Uruguayan touristic resort, Punta del Este, 360 km away from Buenos Aires. The relevant periods for Argentinean tourists to come to Uruguay are the summer and winter holidays, and the long week-ends. Additionally, many of them have secondary private houses in Uruguay with family relationships, and/or investments and commercial interests.

On the one hand, total yearly tourists represent about 90% of Uruguayan population and Argentinean tourists are nearly 60% of this total; this market share remaining the same over time. On the other hand, tourist activities have a great impact on Uruguayan economy. The Tourism Satellite Account (Alonsopérez, M.J., Riso, W.A., 2012) shows that Tourism represents 4% of Uruguayan GDP, generates 6% of total employment and 14% of the total exports (Tourism Ministry and Uruguayan Central Bank).

## 2. Analysis framework and background

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Paraskevopolous (1977), Loeb (1982), Stronge and Redman (1982), Truett and Truett, (1987), Witt and Witt (1995), Mudambi and Baum (1997), Song et al. (2010) present important researches about the estimation of the determinants of a Tourism Demand. Crouch (1994) find 80 empirical studies on the demand function for tourism while Song and Li (2008) review the published studies on tourism demand modeling and forecasting since 2000. Most of these studies focused on the Income of source countries, and the relative price of the exported tourism services as the main determinants of the Tourism Demand.

Others researches focused on Uruguayan tourism, study the relevance of tourism activities on GDP growth (Brida et al., 2010) while Robano (2000), Altmark et al. (2013), and Serviansky (2011) try to estimate the determinants of the tourism demand. With different emphasis, those experts tried to find a relationship between real tourism spending with real income of the foreign tourists.

Lim (1997) presents a review of more than 100 published studies of empirical International Tourism Demand models. Tourist arrivals/departures and expenditures/receipts have been the most frequently used dependent variables. The most popular explanatory variables used have been Income, relative tourism prices, and transportation costs. Song and Li (2008) found that the methods used in analyzing and forecasting the demand for tourism have been more diverse than those identified by other review articles, and in addition to the most popular time-series and econometric models, a number of new techniques have emerged in the literature.

Spain, a Top 10 tourism country, appeared as the subject of diverse papers about Demand's determinants. Among them, demand is mainly studied with Vector Error Correction Models (VECM) trying to identify not only the characteristics of the agents that are demanding Spanish tourism but also competitors influence on international demand. Through this approach, the authors try to identify Spain competing destinations with countries of similar characteristics in the region.

Álvarez-Díaz et al. model Russian demand for Spanish destinations using Cointegration and VEC models. Quantity of tourists is used as the dependent variable while Russian per capita Income, Spanish and competitors' prices. The authors identify that those determinants are relevant to explain Russian demand. Previously, the same authors studied in a different paper tourism's determinants divided by country, trying to explain them by income variations (using the Industrial Production Index) and prices (with Consumer Price Index), once again using VEC models.

Including competitors' relative prices is not a new approach while studying Spanish tourism. González and Moral in their 1995 paper used this approach while analyzing international demand. In this case, internal as well as competitors' prices play a substantial role determining international tourism demand.

Han et al. (2006) describe international tourism from US towards Europe with an "almost ideal demand system model". This model evidences the linkages between tourists' demand and relative prices, exchange rates and expenditure. The authors find that the different macro-variables impose different effects on the destinations. While US demand for France, Spain or Italy are highly influenced by prices, UK or Spain have a negative correlation with income.

Other particularities can be found while looking the behavior of international tourism demand for Australian destinations. On one hand, Lim and McAleer (2001) paper models the quantity of



tourists from Singapore using as explanatory variables income, relative prices with Australia and with competitors as well as transportation costs. Similarly, to what has been used in the previous cases, the authors use a VEC model as well as a Johansen cointegration model and an Ordinary least squares (OLS) model.

On the other hand, the same authors, in 2002, study the long-run relationship between Malaysia touristic demand and other macroeconomic variables as income, relative exchange rate or price level, combined with transportation expenses using different models. Depending on the model chosen it is possible to identify effects from the different dimensions.

### 3. Data and methodology

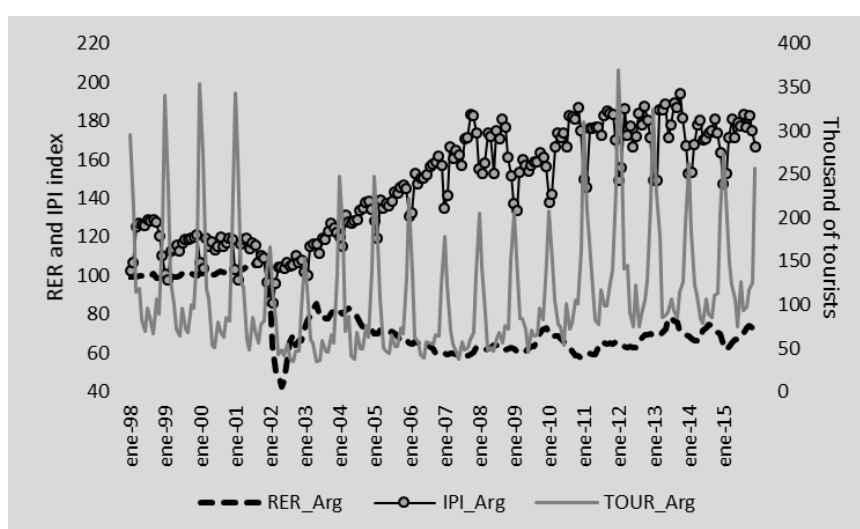
In this paper, the authors try to measure tourism demand comparing Mexico and Uruguay, two different countries, but strongly similar in term of tourism industry relevance for growth, employment and national income.

#### 3.1 Data

The research studied period is from January 1998 to December 2015, using monthly data and considering the log transformation of the series, to solve scale problems between the series. To estimate the tourist's income, the Industrial production index (IPI) has been used as a *proxy*, taking advantage of the monthly provided information. To estimate the relative prices between countries, the authors used the bilateral real exchange rate (RER) between countries. In all cases, the RERs have been calculated from the hosting country point of view, improving the competitiveness of Uruguay or Mexico towards Argentina or US when the index increases its value.

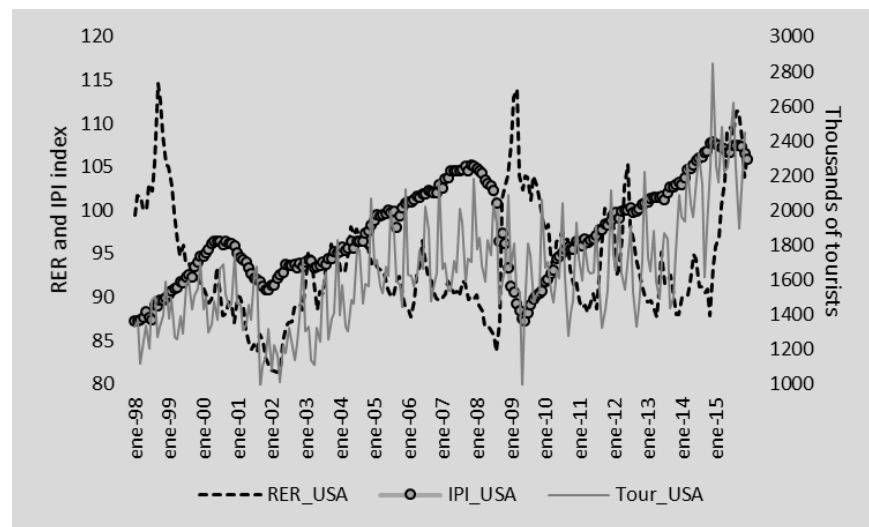
Figure 1 shows the Uruguayan model series. In the tourist and the IPI series, a marked seasonality is revealed, which has been corrected introducing seasonal dummies. This figure highlights the 2001-2002 regional crisis, with the implied high devaluation in Argentina (December 2001) and in Uruguay (from August 2002), reflected in the bilateral RER path.

**FIGURE 1 – URUGAYAN MODEL SERIES**



In Figure 2, time series of the Mexican model have been represented: the US monthly tourists' arrivals in Mexico (TOUR\_USA), the bilateral real exchange rate between Mexico and USA (RER\_USA: it increases as Mexican competitiveness in relation to the US improves) and the US Industrial production index (IPI\_USA), as a *proxy* of US citizen's income. Finally, seasonal dummies have been added to correct seasonality mainly in tourists' series. In the IPI series it is evident the US crisis of 2008.

**FIGURE 2 – MEXICAN MODEL SERIES**



### 3.1.1 Methodology and Model

The authors try to find a long-run relationship for tourism demand and the most important source of tourism for each country: United States' tourists for Mexico and Argentina's tourists for Uruguay.

The tourism demand equation will be:

$$x_i = \alpha_i RER_i + \beta_i IPI_i + \gamma_i$$

Where  $x_i$  is the tourist demand for country  $i =$  Mexico, Uruguay

RER is the country's bilateral real exchange rate with the corresponding partner: Argentina for Uruguay and US for Mexico.

IPI is the Industrial Production Index used as a proxy of the country's income of the corresponding partner: Argentina for Uruguay and USA for Mexico.

In table 1 we show the results of ADF test to study the series stationarity.

TABLE 1 – UNIT ROOT TESTS

Augmented Dickey-Fuller (ADF)				
H <sub>0</sub> = there is an unit root				
	Statistic value of the series in levels	Rejection H <sub>0</sub> up to 95%	Statistic value of the series in first differences	Rejection H <sub>0</sub> up to 95%
<i>LTour_Arg</i>	0.076321	No	-4.286977	Yes
	(no constant, 13 lags)		(no constant, 12 lags)	
<i>LTour_USA</i>	1.004104	No	-3.858005	Yes
	(no constant, 13 lags)		(no constant, 12 lags)	
<i>LIPI_Arg</i>	1.100784	No	-3.179880	Yes
	(no constant, 13 lags)		(no constant, 14 lags)	
<i>LIPI_USA</i>	0.481431	No	-3.613775	Yes
	(no constant, 7 lags)		(no constant, 3 lags)	
<i>LRER_Arg</i>	-0.698396	No	-6.130425	Yes
	(no constant, 11 lags)		(no constant, 10 lags)	
<i>LRER_USA</i>	0.030842	No	-6.068407	Yes
	(no constant, 7 lags)		(no constant, 6 lags)	
<i>LRER_Arg_Bra</i>	-0.043243	No	-6.614358	Yes
	(no constant, 10 lags)		(no constant, 4 lags)	
	(no constant, 5 lags)		(no constant, 12 lags)	

Lags are calculated due to Akaike criteria

As a result of the ADF test, all the variables resulted integrated of first order, I(1). Taking into account this result, the authors decided to apply the Johansen (1988, 1992) methodology to test the existence of long-term equilibrium relationships among the variables, looking for cointegration vectors.

### **Johansen Cointegration Methodology**

Following Enders (1995), cointegration analysis is based on an autoregressive vector with Vector Error Correction Model specification for an endogenous variable vector.

$$\Delta X_{it} = A_1 \Delta X_{(it-1)} + \dots + A_k \Delta X_{(it-k+1)} + \Pi X_{(it-k)} + \mu + \Gamma D_t + \xi_{it} \quad t=1, \dots, T$$

Where  $\xi_{it} \sim N(0, \sigma^2)$

$\mu$  is a vector of constants and  $D_t$  contains a set of dummies (seasonal and interventions).

Information about long-term relationships is included in the  $\Pi = \alpha\beta'$  matrix, where  $\beta$  is the coefficient's vector for the existing equilibrium relationships, and  $\alpha$  is the vector for short-term

adjustment mechanism coefficients. The identification of the matrix  $\Pi$  range determines the total cointegration relationships existing among the variables.

Once examined the long-term relationship, the authors proceed to the short-term analysis, which shows different adjustment mechanisms of the variables to the long-run equilibrium.

## 4. Main results

The cointegration is then analyzed with the Johansen test, from the Trace and the Eigenvalue of matrix  $\Pi$  (Tables 2 and 3). The existence of a cointegrating vector was not rejected, and the signs of the variables were as expected. Moreover, in the resulting pattern exclusion tests for  $\beta$  and weak exogeneity test for  $\alpha$  all were significant. Furthermore, residuals were well behaved (see the Appendix).

**TABLE 2 - COINTEGRATION TEST FOR URUGUAYAN TOURISM FROM ARGENTINA**

<b>Unrestricted Cointegration Rank Test (Trace)</b>				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.211155	78.66564	47.85613	0.0000
At most 1*	0.097137	30.75410	29.79707	0.0387
At most 2	0.046183	10.11277	15.49471	0.2722
At most 3	0.002776	0.561436	3.841466	0.4537
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level - **MacKinnon-Haug-Michelis (1999) p-values				
<b>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</b>				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.211155	47.91155	27.58434	0.0000
At most 1	0.097137	20.64133	21.13162	0.0584
At most 2	0.046183	9.551331	14.26460	0.2431
At most 3	0.002776	0.561436	3.841466	0.4537
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level - **MacKinnon-Haug-Michelis (1999) p-values				

For the Uruguayan model, two cointegration vectors were found, with the Trace test, but only one with Maximum Eigenvalue, concluding that there is only one long-run cointegration vector between the variables.

In this model, the authors also included the RER between Argentina and Brazil, as Brazil is the most important alternative destination of Argentine tourists coming to Uruguay, not being significant in either the short or the long term. However, the authors decided to keep it in the model due to the improvements in the residuals behavior.

The long-run cointegration vector for Uruguayan model is:

$$L\text{Tour}_{-Arg_t} = 2.987 \text{LIPI}_{-Arg_t} + 2.651 \text{RER}_{-Arg_t} - 14.0727 \quad (1)$$

(9.71742)                      (8.35403)

Both coefficients were significantly different from zero, and LIPI\_Arg coefficient was near 3, and as this variable is a proxy of Argentinean's income, its coefficient is a proxy of income elasticity of tourism to Uruguay, and as a luxury expenditure, it was greater than one.

**TABLE 3 - COINTEGRATION TEST FOR MEXICAN TOURISM FROM US**

<b>Unrestricted Cointegration Rank Test (Trace)</b>				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.167156	50.48001	29.79707	0.0001
At most 1	0.064341	13.53252	15.49471	0.0967
At most 2	0.000489	0.098767	3.841466	0.7533
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level - **MacKinnon-Haug-Michelis (1999) p-values				
<b>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</b>				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.167156	36.94749	21.13162	0.0002
At most 1	0.064341	13.43376	14.26460	0.0673
At most 2	0.000489	0.098767	3.841466	0.7533
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level - **MacKinnon-Haug-Michelis (1999) p-values				

The long-run cointegration vector for Mexican model is:

$$L\text{Tour\_USA}_t = 2.336 \text{LIPI\_USA}_t + 1.981 \text{RER\_USA}_t - 12.295 \quad (2)$$

(7.83562)                      (7.34006)

In the Mexican model, the coefficients were smaller than for Uruguayan model, but significantly greater than one, what also confirms that tourism is a luxury good (or service). Nevertheless, in the US citizen's travel characteristics to Mexico, there are components of business or other reasons different from recreational travels.

### **Impulse response functions**

The impulse response functions help to understand the dynamic interactions that characterize the system estimated. Those allow the authors to identify them using the model simulation. As all the variables in a VEC model are endogenous, the authors simulate a shock on some variables to see the impact on the variable to be explained. In this case, the authors simulate a shock on Argentina's income (LIPI\_Arg) and on relative prices (LRER\_Arg), to see the impact on Argentinean tourists visiting Uruguay (Figure 3). For the second model, the authors simulate a shock on US income (LIPI\_USA) and on relative prices (LRER\_USA), to see the impact on US citizens' tourists visiting Mexico (Figure 4).

**FIGURE 3 – LTOUR\_Arg impulse response functions**

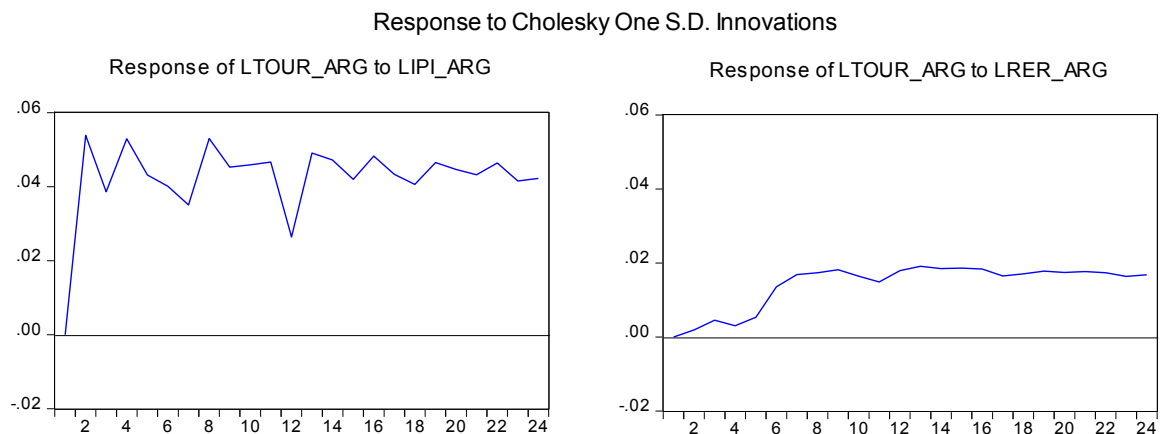
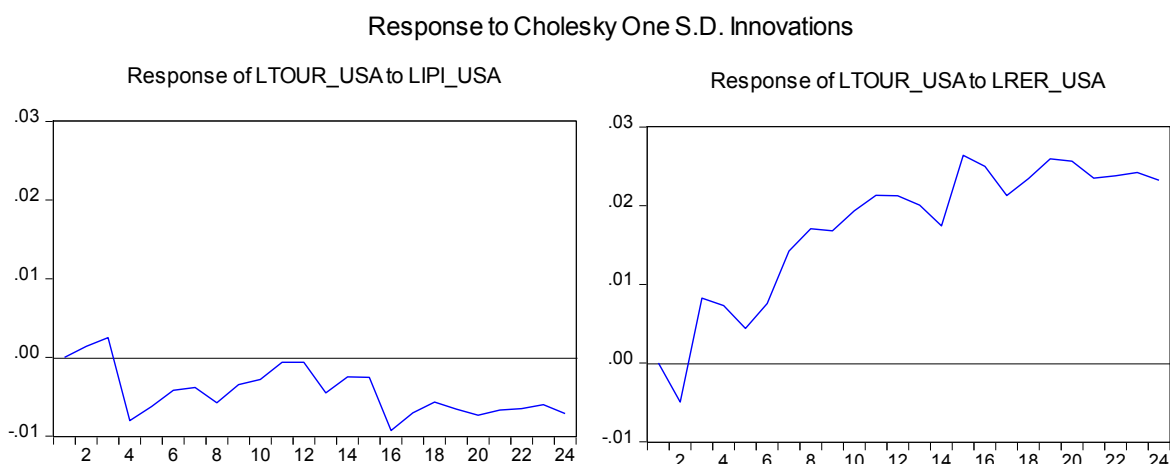


Figure 3 enables to appreciate the impulse response functions of a shock on Argentines income (LIPI\_Arg) and on relative prices between Uruguay and Argentina (LRER\_arg) over Argentinean tourists visiting Uruguay. Both have a positive and permanent impact, but the income impact more than doubles the prices impact. This result has a high relevance for policy makers, considering the importance of Argentinean's income situation when they decide how to spend their holidays due to the positive relative prices shocks (measured on RER). After approximately 8 months, this would have an impact implying a 2% increase on the number of tourists. Additionally, an income shock having an immediate answer, after two months the number of tourists would increase near 5%.

This result can also be a consequence of the special characteristic of Argentinean tourists: near 40% of Argentinean tourists use their own houses in Uruguay or visit some relatives (Brida et al., 2012), what is known as "captive tourism".

**FIGURE 4 – LTOUR\_USA impulse response functions**

In the case of US tourists traveling to Mexico, the impulse response functions show a slight negative but no significant impact of a shock on US income, but a positive a significant response of tourists to a positive impact over bilateral RER between US and Mexico. From these results, the authors can conclude that the Mexican tourist demand from US citizens depends on the bilateral real exchange rate, and income changes have no impact, mainly in the considered period (January 1998 to December 2015).

## 5. Final remarks

The main objective of this research was to estimate and compare the Tourism Demand for Uruguay and Mexico from the main outbound tourism countries: Argentina for Uruguay and the USA for Mexico. Tourism is frequently viewed as an important engine for the economic growth and development of countries. In Mexico, the domestic trips have become a notable feature but the main tourism exports are from international travelers for who Mexico was the 9th country more attractive in 2015 and 58.3% tourists came from the USA. For Uruguay, total yearly tourists represent about 90% of its population, Argentinean tourists being nearly 60% of this total and historically the main visitors.

This objective was instrumented through the estimation of two models, one for each country, through Johansen methodology. The authors found one long-term relationship for each country tourist demand, both including Industrial production index as a monthly proxy of the country's income and the bilateral real exchange rate as a proxy of relative prices between the analyzed countries.

The authors also highlighted one cointegration relationship for each country, through Vector error correction models (VECM). The authors calculated an income-elasticity greater than 2 for American tourists in Mexico, and near 3 for Argentinean tourists in Uruguay. The two models show income-elasticities greater than one, showing that the characteristic of "luxury" good can be applied to tourism. Bilateral RER also were significant in both models.

Through the impulse response functions, the authors can appreciate the difference between both country's tourist demands. In the case of Uruguay, shocks on both variables (income and

relative prices) produce an impact on the number of Argentinean tourists visiting Uruguay, but the income's impact (here estimated through the monthly IPI) resulted more than double than prices impact (estimated through bilateral RER). The impact of income shock has an immediate effect on the Argentinean tourists visiting Uruguay, almost 5% the second month after the shock. In the case of the RER, the impact reaches 2% within 8 months.

A shock on US income simulated by the impulse response functions shows no significant impact on the number of US tourists visiting Mexico. But there is a significant impact of a RER shock, that reaches 2,5% within 14 months.

These results are crucial when studying the behavior of tourism stakeholders. The private and public sectors must consider them as an additional instrument for planning, elaborating and implementing future strategies or policies for this particular sector.



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## 7. Appendix<sup>4</sup>

### Model 1. Uruguayan tourism demand from Argentina

#### *Normality residual tests*

VEC Residual NormalityTests				
Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: residuals are multivariate normal				
Date: 08/31/16 Time: 14:11				
Sample: 1998M01 2015M12				
Included observations: 202				
Component	Skewness	Chi-sq	df	Prob.
1	-0.168940	0.960868	1	0.3270
2	0.035830	0.043220	1	0.8353
3	0.153168	0.789834	1	0.3742
4	0.230985	1.796249	1	0.1802
Joint		3.590171	4	0.4643
Component	Kurtosis	Chi-sq	df	Prob.
1	2.991325	0.000633	1	0.9799
2	3.661738	3.685636	1	0.0549
3	3.572679	2.760342	1	0.0966
4	3.327121	0.900652	1	0.3426
Joint		7.347263	4	0.1186
Component	Jarque-Bera	df	Prob.	
1	0.961501	2	0.6183	
2	3.728856	2	0.1550	
3	3.550176	2	0.1695	
4	2.696900	2	0.2596	
Joint	10.93743	8	0.2053	

<sup>4</sup> The econometrics estimations were made using E-views 9. The details of the econometric estimations can be requested to the authors.

**Autocorrelation residual tests**

Lags	LM-Stat	Prob
1	15.69975	0.4741
2	13.99723	0.5989
3	25.00851	0.0697
4	20.55264	0.1964
5	22.50152	0.1277
6	17.28593	0.3673
7	20.88412	0.1830
8	25.01981	0.0695
9	28.67583	0.0262
10	16.70165	0.4052
11	16.98878	0.3863
12	27.96959	0.0319

Probs from chi-square with 16 df.

**Estimated model**

Vector Error CorrectionEstimates				
Date: 08/31/16 Time: 15:26				
Sample (adjusted): 1999M01 2015M10				
Included observations: 202 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
CointegrationRestrictions:				
B(1,1)=1, B(1,4)=0, A(4,1)=0				
Convergenceachievedafter 9 iterations.				
Restrictions identify all cointegrating vectors				
LR test for binding restrictions (rank = 1):				
Chi-square(2)	0.289454			
Probability	0.865258			
CointegratingEq:	CointEq1			
LTOUR_ARG(-1)	1.000000			
LIPI_ARG(-1)	-2.986666 (0.30735) [-9.71742]			
LRER_ARG(-1)	-2.651338 (0.31737) [-8.35403]			
LRER_ARG_BRA(-1)	0.000000			
C	14.72698			
Error Correction:	D(LTOUR_ARG)	D(LIPI_ARG)	D(LRER_ARG)	D(LRER_ARG_BRA)
CointEq1	-0.095385 (0.03828) [-2.49162]	0.019990 (0.01126) [ 1.77535]	0.031544 (0.00684) [ 4.61120]	0.000000 (0.00000) [NA]

**Model 2. Mexican tourism demand from US*****Normality residual tests***

VEC Residual NormalityTests				
Orthogonalization: Cholesky (Lutkepohl)				
Null Hypothesis: residuals are multivariate normal				
Date: 08/31/16 Time: 15:29				
Sample: 1998M01 2015M12				
Included observations: 202				
Component	Skewness	Chi-sq	df	Prob.
1	0.083818	0.236526	1	0.6267
2	-0.075736	0.193108	1	0.6603
3	0.142713	0.685691	1	0.4076
Joint		1.115325	3	0.7734
Component	Kurtosis	Chi-sq	df	Prob.
1	3.097711	0.080357	1	0.7768
2	2.882523	0.116158	1	0.7332
3	3.320789	0.866123	1	0.3520
Joint		1.062638	3	0.7861
Component	Jarque-Bera	df	Prob.	
1	0.316883	2	0.8535	
2	0.309266	2	0.8567	
3	1.551813	2	0.4603	
Joint	2.177962	6	0.9026	

**Autocorrelation residual tests**

Lags	LM-Stat	Prob
1	8.499261	0.4847
2	8.159813	0.5181
3	10.47951	0.3131
4	12.14074	0.2055
5	15.26063	0.0840
6	13.33584	0.1480
7	6.503753	0.6886
8	9.976442	0.3524
9	19.39269	0.0221
10	9.356655	0.4050
11	11.28376	0.2568
12	13.48303	0.1419

Probs from chi-square with 9 df.



**Estimated model**

Vector Error Correction Estimates			
Date: 08/31/16 Time: 15:30			
Sample (adjusted): 1999M02 2015M11			
Included observations: 202 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
Cointegration Restrictions:			
B(1,1)=1, A(2,1)=0			
Convergence achieved after 10 iterations.			
Restrictions identify all cointegrating vectors			
LR test for binding restrictions (rank = 1):			
Chi-square(1)	0.954595		
Probability	0.328552		
Cointegrating Eq:	CointEq1		
LTOUR_USA(-1)	1.000000		
LIPI_USA(-1)	-2.335944 (0.29812) [-7.83562]		
LRER_USA(-1)	-1.980517 (0.26982) [-7.34006]		
C	12.29525		
Error Correction:	D(LTOUR_USA)	D(LIPI_USA)	D(LRER_USA)
CointEq1	-0.149976 (0.04857) [-3.08799]	0.000000 (0.00000) [NA]	0.073583 (0.01817) [ 4.04886]

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**Instituto de Economía**

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