Journal of Applied Economics and Business Research
JAEBR, 8(3): 162-174 (2018)

The Asymmetric Effects of Exchange Rates on the US Tourism Balances in the NAFTA Countries: An Application of The Nonlinear ARDL Approach

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Abstract

This study primarily aims to investigate the effects of real exchange rate changes between the USD-Mexican Peso (MXN) and the USD-Canadian Dollar (CAD) on the US tourism balances bilaterally over the period 1996M1–2016M6. To this aim, we apply both linear and nonlinear ARDL cointegration approaches. The nonlinear ARDL approach, developed by Shin et al. (2014), allows us to examine the separate effects of both depreciations and appreciations in the USD on the US tourism balances. In this respect, this study is the first attempt at applying the nonlinear ARDL cointegration approach to a tourism demand model. The empirical findings indicate that Mexican and Canadian tourists positively respond to depreciations in the USD against the MXN and CAD and thereby improve the US tourism balances bilaterally with these two countries. Additionally, the nonlinear ARDL approach reveals that while depreciations and appreciations in the USD have different (asymmetric) effects on the US tourism balances with Mexico, the same changes in the USD have symmetric effects on these balances with Canada. As a secondary aim, this empirical study also tries to draw attention to the US tourism balances with these two NAFTA countries.

Keywords: NAFTA, US tourism balance, Nonlinear ARDL, Asymmetry, Symmetry

JEL Codes: O51, Z30, F47, F00, O24

1. Introduction

The USA is the second most-visited country in the world. According to the United Nation World Tourism Organization (UNWTO), 77.5 million international tourists visited the country and spent 204.5 billion USD in 2015 (UNWTO, 2016). 50.1% of these tourists came from the two other countries within the North American Free Trade Agreement (NAFTA), Canada and Mexico. The tourists from these two countries spent 42.4 billion USD in the USA and thereby constituted 20.7% of all the US international tourist receipts in 2015 (NTTOa, b, 2016). In other words, Canada and Mexico are two largest tourist markets of the USA. Similarly, these two countries are also the most-visited countries by US tourists as 55.6% of all US tourists who traveled abroad visited these two countries in 2015 (NTTOa). Therefore, for these three NAFTA countries, international tourism is similar to international trade because it is a large component of their national economies.

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Likewise, international tourism, like international trade, might be considered a "bilateral balance concept". More specifically, similar to how net exports (export minus imports), commonly referred to as "trade balance", might hold greater economic significance analytically than exports and import volumes separately, in international tourism, net inbound tourist arrivals (inbound arrivals minus outbound departures), as "tourism balance", might hold a greater significance than inbound arrivals and outbound arrivals individually (Isik et al., 2017; Ongan et al., 2017; Isik et al., 2017).

Additionally, for both international tourism and trade, exchange rate is one of the most important determinants affecting consumers' purchasing selection on domestic or imported products, such as tourists' destination country selection (Işik et al., 2018; Işik et al., 2017). The effects of exchange rate changes on the trade balances of countries can be tested with J-curve hypothesis developed by Magee (1973).

According to the J-curve hypothesis when the local currency depreciates the home countries' products become cheaper for consumers abroad and more expensive for domestic consumers. Consequently, it is expected that home countries will export more and import less. The depreciations in a home country's exchange rate with its trading partner worsen its trade balances in the short-run (stemming from the increase in domestic currency prices for imports) but improve its trade balance gradually in the long-run. This pattern of initial worsening in countries' trade balances and the eventual long-run improvement resembles the letter "J." For this reason, this pattern is known as the "J-curve". However, this expectation can only be realized if the Marshall–Lerner Condition (ML) developed by Marshall (1923) and Lerner (1944) is met. Since Magee introduced the J-curve hypothesis in 1973, many researchers[2] have been trying to test the validity of the J-curve hypothesis for different countries.

This study is constructed on the similar expectations of the J-curve hypothesis in some degree. It means that inbound tourist arrivals to the USA should be considered as exports of this country and outbound tourist departures from the USA should be considered as imports of the same country. Therefore, similarly like in the J-curve hypothesis, it is expected that the depreciations in the USD will improve the tourism balances of the USA. Because, the depreciation in the USD against other countries' (Canada and Mexico in our case) currencies will increase the number of inbound tourist arrivals to USA by making the visitations to the USA cheaper for the foreign tourists. Likewise, same changes in the USD will decrease the number of outbound tourist departures from the USA by making the visitations to other countries more expensive for US tourists. However, this doesn't mean that this study tests the J-curve hypothesis in relation to the USA's tourism balances with Canada and Mexico. In this study, we just inspire from the mechanism and causing factors of J-curve hypothesis in terms of the variables (export-import in trade balance, inbound arrivals- outbound departures in tourism balance).

In this study, we aim to investigate the effects of real exchange rate changes between the USD-Mexican Peso (MXN) and the USD-Canadian Dollar (CAD) on the US tourism balances bilaterally. This study is limited to the NAFTA countries. Because there has been an increasing amount of discussion and criticism in the USA about NAFTA since the USA's controversially large negative bilateral trade balances with Canada and Mexico. Therefore, this study tries to

[2] Rose and Yellen (1989), Bahmani-Oskoee and Ratha (2004), Bahmani-Oskooee and Hegerty (2010), Halicioglu (2008), Hsing et al. (2010), and Bahmani-Oskooee et al. (2016a and 2016b).

 ISSN 1927-033X

draw attention to the USA's tourism balances with these two countries through its empirical model.

The rest of the paper is organized as follows. Section 2 provides a short literature review. Section 3 explains the empirical methodology. Section 4 explains the empirical model and provides the data set. Section 5 provides empirical results of the study. Section 6 provides the conclusion with recommendations for application and additional research.

2. Literature Review

More than fifty years ago, Mundell (1963) showed the importance of a government's choice between its independent monetary policy and its exchange rate regime and this choice's effects on the capital mobility of a country. In recent years, rising globalization and technological advancement has increased the importance and awareness of the exchange rates in a country's economy. These developments also caused global exchange rates to become more volatile than ever.

Like all other economic actors, Witt and Martin (1987) assume that most tourists are aware of the fluctuations in exchange rates which may change their selections of destination countries. Many studies reveal that tourists are sensitive to changes in exchange rates (Crouch, 1995; Dwyer et al., 2002; Onder, Candemir, and Kumral, 2009; Patsouratis, Frangouli, and Anastasopoulos, 2005; Song and Li (2008; Agiomirgianakis, 2012; Harvey et al., 2013). Song et al. (2010) note that exchange rates, besides tourists' income and relative prices between the destination and origin countries, are the most important determinants (independent variables) in tourism demand models. According to Gray (1966) and Martin and Witt (1987) tourists are more aware of exchange rates rather than relative prices in their destination selection. Similarly, Dwyer (2002) reveals that changes in nominal exchange rates are more decisive in changes in relative prices rather than the changes in relative inflation rates.

However, Martin and Witt (1987) note that nominal exchange rate alone is not an acceptable proxy for the costs encountered by tourists. For this reason, the majority of tourism demand models use the general Consume Price Indexes (CPIs) of both tourist generator and destination countries for the relative prices of tourist products and services. These studies then use the real exchange rate (which is adjusted for inflation with the CPIs) as an independent variable (Thompson and Thompson, 2010; Dritsakis, 2004; Dritsakis and Gialetaki, 2004; Cheng et al., 2013; Brida et al., 2008); Vogt, 2008; Nowjee et al. 2012; Tolic et al. 2014; Falk, 2014; Albaladejo et al. 2016). Yet, it is also argued that the general CPI may not show the price level of products and services that tourists often and directly encounter (Divisekera, 2003; Dwyer et al., 2000; Lim, 1997; Perez Mira, 2002). Furthermore, some tourist products and services which tourists utilize may not have a price (Brida and Scuderi, 2013; Laesser and Crouch, 2006). Nevertheless, because of the non-availability and difficulty of the price indexes created from only tourist products and services, CPI is widely used for the transformation of nominal exchange rates to real exchange rates.

In the previous studies investigating the effects of exchange rates on international tourism demand several empirical methodologies have been applied for different countries. For instance, Quadri and Zheng (2010) apply regression analysis and find no relationships between exchange rates and international tourist arrivals from 11 of 19 countries. Akar (2012) applies the DCC-GARCH model and finds that changes in exchange rates between Turkish Lira and the currencies of several tourist generator countries have positive effects on tourism demand of Turkey. Chan and McAleer (2012) use the heterogeneous autoregressive model for tourist arrivals to Taiwan and find that changes in exchange rates negatively affect the tourist arrivals to the country. Tang et al. (2016) apply the copula-based GARCH model and find that tourism demand of China does not respond to the fluctuations in exchange rates between Chinese and six countries' currencies. Yap (2012) applies multivariate conditional volatility models and finds that tourist arrivals to Australia from two countries are more sensitive to volatility in Australian currency than the other seven countries. Nowjee et al. (2012) use multivariate vector error correction model and find that the number of tourist arrivals to Mauritius do not respond to changes in exchange rates between the country's currency and the tourist generator countries' currencies. Saayman and Saayman (2013) use GARCH models and ADL models and find relationships between exchange rates and tourist arrivals to South Africa from some countries but not all. Vita (2014) applies a system generalized methods of moments (SYS-GMM) for 27 OECD and non-OECD countries and finds that exchange rate regimes affect the inbound tourism flows. Thus, the empirical findings are mixed and vary depending on the countries, the data samples and time horizon in different studies.

3. Empirical Methodology

To investigate the effects of real exchange rate changes between the USD-MXN and the USD-CAD on the US tourism balances bilaterally we apply both the linear and the nonlinear ARDL cointegration approaches. The nonlinear ARDL approach, newly developed by Shin et al. (2014) allows us to examine the separate effects of both depreciations and appreciations on the tourism balances of the USA. To the best of our knowledge, this is the first attempt at applying the nonlinear ARDL cointegration approach to tourism demand models testing the effects of exchange rate changes on a country's tourism balances (demand). By using this approach, we may be able to identify whether the depreciations in the USD affect the tourism balances of the USA differently than the appreciation do. If so, these findings will imply the asymmetric effects of the real exchange rate changes on the US tourism balances. The linear ARDL approach is based on that the relationships between the variables are linear. But, the relationships may be nonlinear. Therefore, we apply both approaches to compare the empirical results of linear approach with nonlinear approach separating the effects of appreciations and depreciation in the USD on the US tourism balances with Canada and Mexico bilaterally. This new approach may provide us more evidence whether the exchange rate changes affect the tourism balances (demand) of the countries. In the next section of the study, we will first apply the linear cointegration approach and then apply the nonlinear cointegration approach.

4. Empirical Model and Data Set

The empirical model of this study, shown in Eq.1, is adapted from Rose and Yellen's (1989) reduced form below model testing the J-curve hypothesis.

$$TB_i = \beta_0 + \beta_1 Y_{USA} + \beta_2 Y_i + \beta_3 REX_i + \varepsilon_t \qquad (1)$$

Eq. 1 can be expressed in logarithmic form as follows:

$$InTB_i = \beta_0 + \beta_1 lnY_{USA} + \beta_2 lnY_i + \beta_3 lnREX_i + \varepsilon_t \qquad (2)$$

In this equation, it is assumed that tourism balance (TB) of the USA is the function of the incomes of the USA and the USA's tourism partner county i and the bilateral real exchange rate between the USD and its tourism partner country i's currency. In Eq. (2) $lnTB_i$ is defined as the rate of outbound tourist departures from the USA to its tourism partner country i divided by the inbound tourist arrivals to the USA from the same country. The lnY_{USA} and lnY_i are the USA's and its trading partner country i's Industrial Production Indexes (IPI) (as proxy of income). $lnREX_i$ is the bilateral real exchange rate between the USD and her trading partner country i's currency. $lnREX_i$ is defined as $lnREX_i$ = (CPIUSA*NEXi/CPI i), where NEXi is the nominal exchange rate defined as the number of units of partner i's currency per USD. CPIUSA and CPIi are the Consumer Price Indexes of the USA and its trading partner country i.

In Eq.2, we expect the signs of lnY_{USA} and lnY_i are to be positive and negative respectively. This is because, while an increase in the income of the US will increase the number of outbound tourist departures from the US to Canada and Mexico by worsening the US tourism balances, an increase in other two countries' incomes will increase the number of inbound tourist arrivals to the USA from Canada and Mexico by improving the US tourism balances with these countries. On the other hand, the sign of $lnREX_i$ is expected to be positive since the depreciations (declines) in the USD against CAD and MXN will make the visitations the USA cheaper for Canadian and Mexican tourists and thereby improve the US tourism balances.

The data of TB were obtained from the US monthly tourism statistics of the National Travel & Tourism Office (NTTO). The data of the IPI, NEX and CPIs were obtained from the database of the Federal Reserve Bank of St. Louis (FED). The data used are monthly figures covering the period of 1996M1–2016M6.

Now that we have defined the variables in Eq. 2, we apply the linear ARDL cointegration approach of Pesaran et al. (2001) considering both the short and long-run effects of the variables in a same equation. Therefore, we transform the model in Eq.2 to the model in Eq.3 to examine the short and long-run effects of exchange rate changes in USD on the US tourism balances.

$$\Delta lnTB_t = \alpha + \sum_{j=1}^{n} \beta_j \Delta lnTB_{t-j} + \sum_{j=0}^{n} \gamma_j \Delta lnY_{t-j}^{USA} + \sum_{j=0}^{n} \delta_j \Delta lnY_{t-j}^{i} + \sum_{j=0}^{n} \mu_j \Delta lnREX_{t-j} + \theta_1 lnTB_{t-1} + \theta_2 lnY_{t-1}^{USA} + \theta_3 lnY_{t-1}^{i} + \theta_4 lnREX_{t-1} + \varepsilon_t \quad (3)$$

In Eq.3, while significantly positive short and long-run coefficients of μ_j and θ_4 signify that depreciations in REX improve the US tourism balances in short and long-runs respectively, significantly negative coefficients of REX signify that depreciations worsen the country's balances in short and long-runs.

In order to separate the effects of depreciations and appreciations in the USD on the US tourism balances bilateraly with Canada and Mexico we apply the non-linear approach introduced by Shin et al. (2014). The non-linear ARDL cointegration approach nests and extends the linear ARDL approach of Pesaran at al. (2001). Therefore, we add the appreciatons (denotes by POSitive) and depreciations (denotes by NEGative) in the USD separately to the model in Eq.3 as two additional independent variables and we get the model in Eq.4 as in the following form.

$$\Delta lnTB_t = \alpha + \sum_{j=1}^{n} \beta_j \Delta lnTB_{t-j} + \sum_{j=0}^{n} \gamma_j \Delta lnY_{t-j}^{USA} + \sum_{j=0}^{n} \delta_j \Delta lnY_{t-j}^{i} + \sum_{j=0}^{n} \mu_j^{+} \Delta POS_{t-j} + \sum_{j=0}^{n} \mu_j^{-} \Delta NEG_{t-j} + \theta_1 lnTB_{t-1} + \theta_2 lnY_{t-1}^{USA} + \theta_3 lnY_{t-1}^{i} + \theta_4^{+} POS_{t-1} + \theta_4^{-} NEG_{t-1} + \varepsilon_t \quad (4)$$

The partial sums of *POS* and *NEG* changes in the USD are defined in the following form.

$$POS_t = \sum_{j=1}^{t} \Delta lnREX_j^{+} = \sum_{j=1}^{t} \max(\Delta lnRE_j, 0) \quad (5)$$

 ISSN 1927-033X

$$NEG_t = \sum_{j=1}^{t} \Delta lnREX_j^- = \sum_{j=1}^{t} \min(\Delta lnREX_j, 0)$$

In Eq. 4, if the long-run coefficients $\theta_4^- NEG$ and short-run coefficients $\mu_j^- N\Delta EG$ are significantly positive this will imply that depreciations in the USD will improve the US tourism balances in the long and short-runs respectively. If the long-run coefficients $\theta_4^+ POS$ and short-run coefficients $\mu_j^+ \Delta POS$ are significantly positive this will imply that appreciations in the USD will worsen the US tourism balances in the long and short-runs respectively.

5. Empirical Results

In this section of the study, we present the empirical results of the linear and nonlinear ARDL cointegration approaches. First, we present the results of the Augmented Dickey–Fuller (ADF) and Zivot Andrews Unit Root Tests to determine whether the series are stationary. The reason for using two different unit root test methods is to reveal whether both methods support each other in terms of stationary for the series. The test results of both methods are reported in Table 1.

Table 1: Augmented Dickey–Fuller (ADF) and Zivot Andrews Unit Root Test Results

	ADF(CANADA)			*Zivot-Andrews (1992)-(CANADA)*			
Variables	*Intercept*	*Intercept and trend*	*Variables*	*Intercept*	*Break Point*	*Intercept and trend*	*Break Point*
$LNTB_{CAN}$	-1.022(12)	-1.707(12)	$LNTB_{CAN}$	-2.89(12)	2006:06	-2.47(12)	2013:07
LNY_{CAN}	-2.62(0)*	-2.22(0)	LNY_{CAN}	-3.97(3)	2008:08	-3.90(3)	2008:08
LNY_{USA}	-2.63(4)	-3.13(4)	LNY_{USA}	-5.59(5)***	2008:08	-5.62(5)***	2008:08
$LNREX_{CAN}$	-1.38(1)	-1.37(1)	$LNREX_{CAN}$	-2.80(1)	2004:06	-3.30(1)	2009:04
$\Delta LNTB_{CAN}$	-2.94(12)**	-2.86(12)	$\Delta LNTB_{CAN}$	-5.80(11)***	2013:04	-6.71(11)***	2012:09
ΔLNY_{CAN}	-6.96(2)***	-7.08(2)***	ΔLNY_{CAN}	-8.19(2)***	2009:09	-8.18(2)***	2009:09
ΔLNY_{USA}	-4.03(3)***	-4.08(3)***	ΔLNY_{USA}	--	--	--	--
ΔREX_{CAN}	-11.57(0)***	-11.56(0)***	ΔREX_{CAN}	-11.95(0)***	2002:02	-11.93(0)***	2002:02
Critical Values	%1: -3.45 %5: -2.87 %10-2.57	%1: -3.99 %5:-3.42 %10:-3.13	*Critical Values*	%1: -5.34 %5: -4.93 %10:-4.58		%1: -5.57 %5: -5.08 %10:-4.82	
	ADF(MEXICA)			Zivot-Andrews (1992)-(*MEXICA)*			
	Intercept	Intercept and trend	*Variables*	Intercept	Break Point	Intercept and trend	Break Point
$LNTB_{MEX}$	-2.13(12)	-2.22(12)	$LNTB_{MEX}$	-6.11(12)***	2010:01	-6.87(12)***	2010:01
LNY_{MEX}	-2.90(0)	-3.19(0)*	LNY_{MEX}	-5.05(6)***	2008:03	-4.92	2008:03
LNY_{USA}	-2.63(4)*	-3.13(4)	LNY_{USA}	-5.59(5)***	2008:08	-5.62(5)***	2008:08
$LNREX_{MEX}$	2.002(2)	-2.07(2)	$LNREX_{MEX}$	-3.45(2)	2012:12	-3.58(2)	2012:12
$\Delta LNTB_{MEX}$	-4.49(12)***	-4.61(12)***	$\Delta LNTB_{MEX}$	--	--	--	--
ΔLNY_{MEX}	-5.95(3)***	-17.87(0)***	ΔLNY_{MEX}	--	--	-6.93(3)***	2009:007
ΔLNY_{USA}	-4.03(3)***	-4.08(3)***	ΔLNY_{USA}	--	--	--	--
ΔREX_{MEX}	-11.42(1)***	-11.78(1)***	ΔREX_{MEX}	-12.21(1)***	2009:03	-12.37(1)***	2009:04
Critical Values	%1: -3.45 %5: -2.87 %10-2.57	%1: -3.99 %5: -3.42 %10:-3.13	*Critical Values*	%1: -5.34 %5: -4.93 %10:-4.58		%1: -5.57 %5: -5.08 %10:-4.82	

Lag lenghts in parentheses are selected *automatically by* SCI (Schwarz Info Criterian)

The unit root test results in Table 1 reveal that all series are stationary at 5% significance level. The empirical results of both linear and nonlinear ARDL cointegration approaches are reported together in Table 2 for Canada and Mexico.

Table 2: Estimates of the Linear and Non-linear ARDL Models

	Linear ARDL							*Non-linear ARDL*					
	USA-MEXICO			*USA-CANADA*				*USA-MEXICO*			*USA-CANADA*		
	Variables	Coef.	t stat	Variables	Coef.	t stat		Variables	Coef.	t stat	Variables	Coef.	t stat
Long-run estimates	*Constant*	-2.23	-0.42	*Constant*	-0.52	-0.13	Long-run estimates	Constant	-8.82	-2.31**	Constant	115.5	0.17
	lnY_{USA}	12.29	6.04***	lnY_{USA}	3.05	1.03		lnY_{USA}	6.91	4.90***	lnY_{USA}	24.62	0.18
	lnY_{MEX}	-12.15	-9.68***	lnY_{CAN}	-3.38	-1.00		lnY_{MEX}	-4.88	-2.88***	lnY_{CAN}	-50.48	-0.18
	$lnREX$	0.25	0.44	$lnREX$	3.11	2.54**		POS	0.41	1.34	POS	36.64	0.18
Short-run estimates	$\Delta lnTB_{t-1}$	-0.39	-5.19***	$\Delta lnTB_{t-1}$	-0.27	-4.75***	Short-run estimates	NEG	1.13	3.24***	NEG	31.79	0.19
	$\Delta lnTB_{t-2}$	-0.27	-3.69***	$\Delta lnTB_{t-2}$	-0.28	-4.66***		$\Delta lnTB_{t-1}$	-0.24	-3.69***	$\Delta lnTB_{t-1}$	-0.40	-5.76***
	$\Delta lnTB_{t-3}$	-0.17	-2.27**	$\Delta lnTB_{t-3}$	-0.28	-4.80***		$\Delta lnTB_{t-2}$	-0.13	-2.57**	$\Delta lnTB_{t-2}$	-0.41	-6.14***
	$\Delta lnTB_{t-4}$	-0.27	-3.68***	$\Delta lnTB_{t-4}$	-0.30	-5.46***		$\Delta lnTB_{t-4}$	-0.13	-2.67***	$\Delta lnTB_{t-3}$	-0.40	-6.03***
	$\Delta lnTB_{t-5}$	-0.30	-4.06***	$\Delta lnTB_{t-5}$	-0.31	-5.41***		$\Delta lnTB_{t-5}$	-0.17	-3.30***	$\Delta lnTB_{t-4}$	-0.41	-6.76***
	$\Delta lnTB_{t-6}$	-0.49	-6.92***	$\Delta lnTB_{t-6}$	-0.30	-5.70***		$\Delta lnTB_{t-6}$	-0.40	-6.97***	$\Delta lnTB_{t-5}$	-0.41	-6.55***
	$\Delta lnTB_{t-7}$	-0.36	-5.17***	$\Delta lnTB_{t-7}$	-0.34	-5.99***		$\Delta lnTB_{t-7}$	-0.29	-5.56***	$\Delta lnTB_{t-6}$	-0.39	-6.71***
	$\Delta lnTB_{t-8}$	-0.31	-4.42***	$\Delta lnTB_{t-8}$	-0.34	-5.95***		$\Delta lnTB_{t-8}$	-0.250	-3.35***	$\Delta lnTB_{t-7}$	-0.43	-7.52***
	$\Delta lnTB_{t-9}$	-0.24	-3.54***	$\Delta lnTB_{t-9}$	-0.35	-5.93***		$\Delta lnTB_{t-9}$	-0.170	-2.90***	$\Delta lnTB_{t-8}$	-0.41	-7.44***
	$\Delta lnTB_{t-10}$	-0.38	-5.55***	$\Delta lnTB_{t-10}$	-0.35	-6.39***		$\Delta lnTB_{t-10}$	-0.32	-5.35***	$\Delta lnTB_{t-9}$	-0.42	-7.12***
	$\Delta lnTB_{t-11}$	-0.34	-5.23***	$\Delta lnTB_{t-11}$	-0.36	-6.71***		$\Delta lnTB_{t-11}$	-0.29	-5.08***	$\Delta lnTB_{t-10}$	-0.41	-8.26***
	$\Delta lnTB_{t-12}$	0.14	2.49**	$\Delta lnTB_{t-12}$	0.59	10.49***		$\Delta lnTB_{t-12}$	0.19	2.48**	$\Delta lnTB_{t-11}$	-0.41	-7.89***
	$\Delta lnY_{USA\,t-5}$	-8.10	-4.29***	$\Delta lnY_{CAN\,t-1}$	-0.85	-2.01**		$\Delta lnY_{USA\,t-5}$	-8.77	-3.94***	$\Delta lnTB_{t-12}$	0.54	9.93***
	$\Delta lnY_{USA\,t-6}$	-4.45	-2.17**	$\Delta lnY_{CAN\,t-5}$	1.96	4.26***		$\Delta lnY_{USA\,t-6}$	-5.30	-2.12**	$\Delta lnY_{USA\,t-7}$	1.88	2.67***
	$\Delta lnREX_{t-5}$	1.37	2.48**					$\Delta lnY_{MEX\,t-1}$	-3.13	-2.17**	$\Delta lnY_{CAN\,t-5}$	2.06	4.63***
	$\Delta lnREX_{t-9}$	1.54	2.76***					ΔPOS_{t-5}	1.76	3.36***	ΔPOS_{t-1}	1.24	3.57***
								ΔNEG_{t-9}	3.77	3.11***	ΔPOS_{t-4}	0.85	1.57
											ΔPOS_{t-8}	1.09	3.55***
Diagnostic statistic													
	F=12.30*** R^2= 0.68 Adj. R^2 = 0.65 ECM_{t-1}:-0.29 (4.95) χ^2_{SC} = 18.29[0.10] χ^2_{HET} = 0.63 [0.42]			*F*=8.43*** R^2= 0.94 Adj. R^2 = 0.93 ECM_{t-1}:-0.11(2.66) χ^2_{SC} =9.47 [0.008] The Newey-West correction is applied. χ^2_{HET} =10.83 [0.90]				*F*=12.76*** R^2= 0.70Adj. R^2 = 0.67 ECM_{t-1}:-0.43 (7.26) χ^2_{SC} =25.97 [0.01] The Newey-West correction is applied. χ^2_{HET} =0.37 [0.54] W_{LR}= 10.59[0.001]			*F*=6.02*** R^2= 0.95 Adj. R^2 = 0.94 ECM_{t-1}:-0.009 (0.19) χ^2_{SC} =9.54 [0.008] The Newey-West correction is applied χ^2_{HET} =13.97 [0.90] W_{LR}= 4.85[0.86]		

Pesaran, Shin and Smith (2001) tabulate the %5 critical values for k=3 as follows: F_{crit}= 4.35, k=4 as follows: F_{crit}= 4.01, *** %1, **: %5, *: %10. χ^2_{SC}, χ^2_{HET}, denote LM tests for serial

Correlation, Heteroscedasticit (ARCH), Figures parentheses are the associated t statistic and insquare parentheses are the associated p-values. W_{LR} refers to the Wald test of long-run symmetry

The critical values of Pesaran (2001) for $F-stats$ within a model of three exogenous variables with unrestricted intercept and no trend are 4.35 and 4.89 for upper bounds and 3.23 and 3.69 for lower bounds at the 10% and 5% significance level respectively for the linear ARDL models. They are 3.52 and 4.01 for upper bounds and 2.45 and 2.86 for lower bounds at the same significance levels for the nonlinear models. Hence, the empirical results indicate that both linear and nonlinear approaches support the long-run relationships between the USA-Mexico and the USA-Canada since F-statistics of both approaches for these two countries are higher than the upper bound values.

Although, we find long-run relationships in the linear approach between the USA and Mexico we cannot confirm that depreciations in the USD against the MXN improve the US tourism balances with Mexico in the long-run since t-value of $lnREX$ is positive but not significant. On the other hand, the nonlinear approach confirms that depreciations in the USD against the MXN improve the US tourism balances with Mexico in the long-run since NEG is significantly positive. But, we cannot confirm that appreciations in the USD worsen the US tourism balances with the same country in the long-run since POS is positive but not significant.

Additionally, the linear approach confirms that depreciations in the USD against the CAD improve the US tourism balances with Canada since t-value of $lnREX$ significantly positive. But, the nonlinear approach does not confirm that both appreciations and depreciation in the USD against the CAD worsen and improve the US tourism balances respectively with Canada since POS and NEG are not significantly positive.

Furthermore, to identify whether depreciations (NEG) and appreciations (POS) in the USD have asymmetric effects on the US tourism balance with Mexico and Canada in the long-run, we apply the Wald Test (W). While the calculated estimate (WLong:10.59) of Mexico is highly significant, verifying the asymmetric effects on the US tourism balances, the same estimate (WLong:4.85) of Canada is not significant, verifying the symmetric effects on the US tourism balances. It should be noted that the existence of symmetric effects of NEG and POS is defined with the same size and same sign coefficients. But to determine the existences of symmetric and asymmetric effects, the Wald test, as a formal test, is required for the confirmation. The Newey-West correction is applied to overcome the autocorrelation problem in the series. Furthermore, we apply the $CUSM$ and $CUSM^2$ tests to assess the stability and instability of the coefficients for the estimated models. These test's charts are reported for Mexico and Canada in the appendix. The ECM (error correction model) reveals that the speed of adjustment is higher in Mexico (-0.43) than Canada (-0.11) in the short-run.

Consequently, the nonlinear approach reveals that the Mexican tourists respond to the depreciations in the USD against the MXN positively, improving the US tourism balance with Mexico. The linear approach reveals the same behavior of Canadian tourists under depreciated USD against the CAD, improving the US tourism balances with Canada. The signs of lnY_{USA} and lnY_{MEX} in both approaches are found positive and negative respectively as expected. In other words, while an increase in income of US tourists worsens the US tourism balances, an increase in income of the Mexican tourists improves these balances. Similarly, an increase in income of the Canadian tourists also improves these balances.

 ISSN 1927-033X

6. Conclusion

The goal of this study is to investigate the effects of real exchange rate changes between the USD-MXN and the USD-CAD on the bilateral tourism balances of the USA. To this aim, we apply both linear and nonlinear ARDL cointegration approaches. The nonlinear ARDL approach, newly developed by Shin et al. (2014), allows us to examine the separate effects of both depreciations and appreciations in the USD on the US tourism balances. To the best of our knowledge, this is the first time the nonlinear ARDL cointegration approach is applied to a tourism demand model testing the effects of exchange rate changes on a country's tourism balances (demand).

The linear approach reveals that while depreciations in the USD against the MXN do not improve the US tourism balances with Mexico, the same changes in the USD against the CAD improve these balances with Canada in the long-run. This can be interpreted that potential Mexican tourists to the USA do not use their advantage in exchange rates to visit the USA more. On the other hand, same advantage is used by Canadian tourists and they visit the USA more improving the US tourism balances with this country. Furthermore, the nonlinear ARDL cointegration approach reveals that depreciations in the USD against the MXN improve the US tourism balances with Mexico in the long-run. But we cannot confirm that appreciations in the USD against the MXN worsen the US tourism balances with Mexico. Here, the different results of these two models should not be considered as a kind of contradiction of the study. Because, the structures of both models are methodologically different. While linear model is based on an assumption that variables have linear relations, nonlinear model is based on the nonlinearity. Therefore, it can be interpreted that while nonlinear model discovers this relationship, the linear model doesn't. Additionally, the nonlinear ARDL approach does not confirm that both appreciations and depreciation in the USD against the CAD worsen or improve the US tourism balances with Canada. Furthermore, while the depreciations and appreciations in the USD against the MXN have asymmetric effects on the US tourism balances with Mexico, the same changes in the USD against the CAD have symmetric effects on these balances with Canada.

In conclusion, both linear and nonlinear ARDL approaches together reveal that depreciations in the USD against MXN and CAD improve the US tourism balances with these two countries, thereby making an important contribution to the US economy. Hence, as to the secondary aim of this study, it is suggested that the US policy makers should also take into consideration the bilateral tourism balances of the USA with these two NAFTA countries besides bilateral international trade balances. In other words, just as the budgets and international trade balances of the governments are considered on a balanced context, international tourism should also be considered on the same context. Otherwise, the policy makers of the countries may not see the real picture from a holistic point of view making them to produce not sustainable economic policies. Furthermore, these findings show the need for further empirical studies that use different methodologies to investigate the effects real exchange rates have on bilateral tourism balances of countries like the USA.

 ISSN 1927-033X

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