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The exchange rate; its volatility and tourism demand

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ABSTRACT

This study aims at investigating the long-run and short-run relationships between international tourist arrivals in Mauritius and some of its key driving factors using an autoregressive distributed lag (ARDL) model over the period 1983–2019. Drawing on previous studies and exchange rate, its volatility, tourism infrastructure, relative price, tourists' income and economic crisis are employed as the explanatory variables to examine this nexus. The results show that income and relative price influence tourist arrivals in both the long-run and short-run. In the long run, tourism infrastructure also proves to be significant. Nevertheless, both exchange rate and its volatility are insignificant.

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Exchange rates; exchange rate volatility; tourist arrivals; Mauritius; ARDL

Introduction

The tourism sector remained the fastest-expanding sector in the world before the onset of the COVID-19 pandemic. International tourism receipts increased from around US$2 billion in 1950 to reach around US$1.86 trillion in 2019. According to the Federal Ministry of Economic Cooperation and Development (2022), the same trend was observed in international tourist arrivals, which were approximately 25 million in 1950 and 1.5 billion in 2019. However, since the outbreak of the COVID-19 pandemic in December 2019, which caused the closure of border in destination countries, the international tourism demand has collapsed by 74% and destinations around the world welcomed only 410 million tourists in 2020 and 446 million in 2021 while international tourism receipts dropped to US $550 million in 2020 and US$620 million in 2021 (World Tourism Organization, 2023).

Given the importance of this sector, there has been extensive literature on the determinants of tourism demand (Brida & Scuderi, 2012; Peng et al., 2015; Witt & Witt, 1995 among others). Among the most influential factors are tourists' income, cost of living in the destination country, tourism infrastructure and the level of development of the destination country amongst others. The tourism industry, known as a "currency-earning sector", is highly impacted by exchange rates (Adeleye et al., 2022). The appreciation and depreciation of an origin country's currency impacts transportation costs, thereby influencing travel decisions and potentially affecting visitors' length of stay and expenditure. An appreciating domestic currency can lead to a drop in inbound tourism as the country will be considered as an expensive destination. Conversely, a stable exchange rate reduces transaction uncertainty, encourages global exchange and as such, increases tourism demand.

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Despite its significance, exchange rate and its volatility have received relatively low research attention. Research focusing on small island economies is much scanter. The tourism sector stands as a cornerstone for the economic progress of the small island economy, Mauritius. According to the World Travel and Tourism Council (WTTC) (2022), the tourism sector contributed to 18.8% of the country's GDP in 2019. The number of tourist arrivals to Mauritius in 2019 was around 1.4 million and the government planned to achieve the 1.6 million mark of international tourist arrivals by the end of 2020. However, the COVID-19 pandemic adversely affected tourism in 2020, with the number of tourist arrivals plummeting to 308,980 (Khan Jaffur & Seetanah, 2020). Additionally, the country's currency has experienced a depreciation during the recent years. This context raises one pertinent question of whether the fluctuations in the country's currency or other factors influence its tourism demand.

Despite that these variables are known to substantially affect the traveller's decisions, there exist no rigorous empirical studies on their impacts on tourists' arrivals in a small island and tourist-dependent economy like Mauritius. The present study seeks to bridge this gap in the literature by investigating whether the tourism demand in Mauritius is affected by a set of variables, including exchange rate (which affects the price) and its volatility (which is a measure of uncertainty), in both the long-run and short-run. The investigation employed an autoregressive distributed lag (ARDL) model over a 37-year period (1983–2019). The next section delves into the theoretical and empirical reviews of the hypothesized links. This is followed by a description of the data employed and the chosen methodological approach. The research findings are then outlined and thoroughly discussed. The last section provides a summary of the paper together with some policy recommendations.

Literature review

There is no doubt that the tourism industry is an international business by nature and travelling to any particular country involves converting funds to the respective country's currency. Therefore, unfavourable exchange rates and their volatility can cause changes in travel patterns, especially for vacation purposes (Webber, 2001; World Travel & Tourism Council, 2016). Exchange rates impact tourism in two distinct ways. Firstly, they influence the decision-making process before travel, as travellers choose the destination country. Secondly, exchange rates also affect the intended length of stay and expenditure in the chosen destination country. When the currency of a country appreciates, outbound tourism demand increases as the residents can make the most out of the strong currency to visit other countries and spend more money on the destination. However, this appreciation renders the country costlier for foreigners, leading to a decrease in inbound tourism demand.

On the other hand, Kim and Wong (2006) highlighted that tourism demand is susceptible to changes in policies, issues on health and safety, mega events and the instability of exchange rate (captured by exchange rate volatility). Exchange rate volatility is an indication of the risk associated with the destination country, prompting its inclusion in the modelling of tourism demand as a representation of "uncertainty avoidance" in travel decisions (Jena & Dash, 2020). As mentioned earlier, travellers to a particular country must convert their funds into the local currency, and fluctuations in the domestic currency – appreciation or depreciation – directly influence tourism demand. However, when the value of the currency changes rapidly, this causes the industry to be unstable. That is, a highly volatile exchange rate creates an environment of uncertainty and therefore a country facing a volatile exchange rate may experience a drop in its tourist arrivals. However, very few studies have included exchange rate volatility as an explanatory variable in the modelling of tourism demand.

Empirical review

Exchange rate and tourism demand

A country's tourism demand is influenced not only by its cultural and natural resource attractions but also by other factors such as the income of the tourists, the cost of living in the country and exchange rate fluctuations (Goldstein & Khan, 1985; Magee, 1975; Rhomberg, 1973). Uysal and Crompton (1984) used a least squares multiple regression and found that the number of tourist arrivals to Turkey and tourism expenditures in Turkey were affected by the relative prices, income per capita and exchange rates. Edward Day (1986) found an inverse relationship between tourism expenditure in the United States and the effective exchange rate. Var et al. (1990) examined the impact of exchange rate between Turkey and 20 countries of origin on tourism demand and found that the latter was a significant determinant for 11 out of 20 countries of origin.

Payne and Mervar (2002) established that the real effective exchange rate significantly impacted tourism revenues in Croatia from 1993 to 1999. Several other studies confirmed that exchange rate is a significant factor of tourism demand (Doytch & Nguyen, 2022; Glauco & Khine, 2013; Maulana & Dawood, 2021; Sharif & Afshan, 2016) (see Table A1 for additional studies). However, some studies also found that the exchange rate is not a significant factor for tourism demand (Bozkurt et al., 2021; Cheng et al., 2013; Dhaoui et al., 2017; Dritsakis & Athanasiadis, 1999; Glauco & Khine, 2013; Vanegas & Croes, 2000).

Exchange rate volatility and tourism demand

Webber (2001) established that, in 40% of the cases, a highly volatile exchange rate caused potential tourists to reconsider their travelling decisions. Chang and McAleer (2009) found that exchange rate volatility and international tourism demand in Taiwan were negatively related. Yap (2012) used monthly data from January 1991 to January 2011 for nine origin countries and concluded that exchange rate volatility induced spillover effects on tourism arrivals in Australia. Nevertheless, these effects varied according to the origin countries. The significant and negative link between exchange rate volatility and tourism demand was confirmed by other studies (Aktas et al., 2014; Chi, 2020; Ergen & Yavuz, 2017; Sharma et al., 2019; Wamboye et al., 2020). Nevertheless, some studies suggest the exchange rate volatility has a non-significant impact on tourism demand (Demirel et al., 2013; Dincer et al., 2014; Liangju & Xiaoyun, 2018).

The existing literature depicts a mixed nature of results in empirical studies investigating the impact of exchange rate and its volatility on tourism demand, both within a single country or a set of countries. Furthermore, existing empirical studies focused mainly on developed countries, leaving scant evidence on developing economies, particularly small island economies that heavily depend on tourism and are vulnerable due to their small size and open nature. Additionally, the literature often overlooks the dynamic nature of tourism demand modelling and the exploration of short-run dynamics. This study thus attempts to supplement the literature by addressing these aspects.

Methodology

Exchange rate and exchange rate volatility is added to the set of existing determinants of tourists' arrivals for this study and their effects are examined. The following relationship is suggested based on Seetanah et al. (2011), Wamboye et al. (2020) and existing literature:

$$TA = f(ER, ERV, ROOM, RP, INCOME, Dummy) \tag{1}$$

TA is the international tourist arrival to Mauritius and was extracted from Statistics Mauritius. The trend in international tourist arrivals is displayed in Figure A1. *ER* is the real effective exchange rate of the destination and was extracted from Bruegel Database. It measures how the rupee is fluctuating against other currencies. Theoretically, it is expected

that an appreciation of the latter would cause a drop in tourist arrivals to Mauritius. *ERV* is the exchange rate volatility of Mauritius and is calculated by applying the generalized autoregressive conditional heteroskedasticity (GARCH) on the real effective exchange rate (Glauco & Abbott, 2004; Saayman & Saayman, 2013). Since exchange rate volatility is associated with risk, it is expected to negatively influence the dependent variable. Similarly to Seetanah et al. (2011), ROOM is a proxy used for tourism infrastructure in the destination country and was extracted from Statistics Mauritius. The greater the number of rooms available in the destination country implies that the latter can welcome more tourists (with possibly more competitive price) (Toth, 2016).

RP is the ratio of the consumer price index (CPI) of Mauritius to a weighted CPI of the top five origins. The data was extracted from the World Bank. A higher cost in the destination country as compared to that in the origin country lowers the probability of tourist arrivals. *INCOME* is the weighted gross domestic product (from World Bank) in the top five home countries. The income of tourists measures the ability of the tourists to afford overseas travel and tourism-related expenses (Lim & McAleer, 2001). It is expected to have a significant and positive impact on tourism demand. A dummy variable for the economic crisis is also included in the study with a value of 1 from 2008 to 2012 and it is expected to affect tourism demand negatively (Teitler-Regev et al., 2014). For the purpose of our analysis, all the variables were converted into their natural logarithmic form.

Econometric strategy

The first step involved determining the stationary properties of the variables included in the proposed model. This study employed the Augmented Dickey-Fuller (ADF) unit root test to check for the stationary properties of the variables (Chaudhary, 2020). The null hypothesis of non-stationarity is tested against the alternative hypothesis of stationarity[1]. The next step consisted of inspecting for a long-run relationship among the variables using the ARDL bounds test. The computed F-statistics is compared to two critical values. If the computed F-statistics exceeds the upper critical value, the alternative hypothesis of the long-run relationship is accepted. Upon the confirmation of the presence of a long-run relationship, the long run and short run coefficients were then estimated using the ARDL model (see Appendix 3 for the corresponding equations).

Autoregressive distributed lag (ARDL)

Autoregressive distributed lag (ARDL) models provide insightful information, especially on the long-run associations between variables (Cañal-Fernández & Tascón, 2018). This analytical framework can be used irrespective of whether the variables are solely stationary or integrated of order 1 or they are mutually cointegrated (provided none of the variables are I(2)) (Frimpong & Oteng-Abayie, 2006). Furthermore, the ARDL is effective for small sample sizes.

Table 1. ARDL Bounds Test.

Test Statistics	Value	K
F-Statistic	*4.754889*	*6*
Critical Bounds Value		
Significance	**I(0)**	**I(1)**
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Results

Based on the unit root test results (see Appendix 4), *LVOL* is stationary at level while the remaining variables are stationary after taking their first differences. Thereby supporting the adoption of an ARDL approach. From Table 1, it can be observed that the F-statistic value is 4.75, which is greater than the upper critical values at all significance levels, confirming the presence of a long-run relationship between the variables.[2]

Table 2 presents the results of the long-run coefficients. It can be observed that both exchange rate and exchange rate volatility have an insignificant impact on international tourist arrivals in Mauritius. This result is in line with Joun and Kim (2020) and Nugroho et al. (2014) which concluded that these two variables are not significant factors of tourism demand to a destination country if the country is an attractive market for the tourism industry or the travelling cost to the country is low. The level of income of the tourist has the expected positive and significant coefficient as depicted by (Addison et al., 2023; Wamboye et al., 2020). When income in the home country increases by 1%, tourism demand increases by nearly 2%. This finding is also in accordance with the theory, which suggests that whenever income increases, people have more money to travel (Nguyen, 2022).

Another significant determinant of tourism demand in Mauritius is the level of tourism infrastructure in the destination country, proxied by the number of hotel rooms available in Mauritius. The latter has a positive impact on tourist arrivals. This validates the findings of Mahadevan et al. (2016), Muryani et al. (2020) and Seetanah et al. (2015), who also found that an increase in hotel capacity was associated with an increase in tourism demand. Relative prices, on the other hand, have a negative and significant influence on tourism demand. Theoretically, as the price of a product increases, the demand for the product decreases. According to Nguyen and Paula Remoaldo (2021), more than 87% out of 131 estimates of price elasticity published from the period 2000 to 2019 have negative signs even though different proxies of the variable were used in the studies. The dummy variable accounting for an economic crisis has the expected negative sign but the impact is insignificant. This is in line with the study of Fereidouni et al. (2017).

Table 3 displays the short-run results of the ARDL model. Real effective exchange rate has a negative and insignificant impact on the dependent variable. This could be explained by the fact that tourists coming to Mauritius from these samples were mostly on inclusive (package) tours which are paid in advance according to Orhan et al. (1998). The coefficient of exchange rate volatility is positive and significant, but negligible. As explained by Webber (2001), the impact of exchange rate volatility on tourism demand is dependent on whether the tourists are risk-averse or risk-lovers. In the short run, it can be observed that tourists travelling to Mauritius are risk-seeking as exchange rate volatility has a positive impact on the dependent variable. The level of income in the origin countries has a significant and positive impact on the international tourist arrivals to Mauritius, while the relative price has a negative and significant impact. The coefficient of the estimated error correction term is significant and negative which further supports the long-run relationship depicted previously.

To ensure that the model were correctly estimated, some residual diagnostic and stability tests were carried out. The findings from Table 3 show that the residuals are not serial correlated and are free from

Table 2. Estimated long-run coefficients using the ARDL approach.

Variable	Coefficient	Standard Error	t-Statistic	Probability
LER	−0.475093	0.383702	−1.238182	0.2263
LERV	0.019521	0.015295	1.276251	0.2127
LROOM	0.466625**	0.223444	2.088328	0.0463
LRP	−0.398057***	0.141984	−2.803541	0.0092
LINCOME	1.966121***	0.522495	3.762944	0.0008
DUMMY	0.033358	0.075463	0.442050	0.6620
C	−43.918165***	11.621888	−3.778918	0.0008

Note: ***, **, * denote statistical significance at the 1, 5 and 10% levels; # p-values of F-statistics

Table 3. Estimated short-run coefficients using the ARDL approach.

Variable	Coefficient	Standard Error	t-Statistic	Probability
D(LER)	−0.158465	0.110430	−1.434986	0.1628
D(LERV)	0.006511*	0.003757	1.732921	0.0945
D(LROOM)	0.155640	0.122309	1.272519	0.2140
D(LRP)	−0.082297***	0.029137	−2.824509	0.0088
D(LINCOME)	0.655790***	0.200960	3.263288	0.0030
D(DUMMY)	0.011126	0.024996	0.445137	0.6598
ECT	−0.333545	0.127465	−2.616760	0.0144
Residual Diagnostic Tests				
Breusch-Godfrey Serial Correlation LM test	0.6050[#]			
ARCH Test	0.3265[#]			

Note: ***, **, * denote statistical significance at the 1, 5 and 10% levels; [#] p-values of F-statistics

ARCH effects. Finally, the stability of both the long-run and the short-run dynamics were examined through the Cumulative Sum of Recursive Residuals (CUSUM) and the CUSUM of square (CUSUMSQ) plots. Figure A2 and Figure A3 give a graphical representation of the CUSUM and CUSUMSQ plots. The findings reveal that the plots typically fall within the 5% significance level critical bounds and thus the estimated coefficients were stable.

Conclusion and implications

This study examined the impact of the real effective exchange rate and its volatility on the international tourist arrivals of Mauritius for the period 1983 to 2019. The results of the ADF unit root test concluded that there was a mixture of I(0) and I(1) variables. Given that the F-stats of the Bounds test was greater than the upper bounds at all significance levels, an error correction model was estimated. It was concluded that both exchange rate and exchange rate volatility have insignificant impacts on international tourist arrivals to Mauritius in the long run, which is in line with Joun and Kim (2020) and Nugroho et al. (2014), as the country is considered to be a Paradise Island and is an attractive market for tourism industry. The coefficient of income, relative price and tourism infrastructure are in accordance with theories. In the short run, exchange rate volatility has a significant positive impact on the dependent variable but the coefficient is negligible. As per Webber (2001), we can conclude that travellers to Mauritius are risk lovers in the short run.

Given the insignificance of exchange rate and its volatility, policymakers, at least in Mauritius should focus on other key ingredients of tourism development such as maintaining a stable price level of the country and improving the tourism infrastructure. Notwithstanding this study provides useful information for tourism policymakers, the results should be treated with caution. The limitation of this study is that annual data was used while the tourism literature suggested the use of higher frequency data (monthly or weekly) for a more accurate result. Depending on the availability of higher-frequency data, this study can be replicated. Also, other determinants of tourism demand can be included in the set of determinants used in this study and the time series used can be extended to a longer period depending on data availability.

Notes

1. The unit root test suggests a mixture of both I(0) and I(1) variables in the model (see Table A2), inferring the use of an ARDL framework.
2. The optimal lag length for each variable was selected based on the Schwarz' Bayesian Information Criterion (SIC). For the case of brevity, the results are not reported. As such, an ARDL (1, 0, 0, 0, 1, 0, 0) is estimated.

Disclosure statement

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Appendix 1

Table A1. Studies concluding that exchange rate is a significant determinant of tourism demand.

(1) Payne and Mervar (2002)	(1) Abedtalas and Toprak (2015)
(2) Croes and Vanegas (2005)	(2) Nasir et al. (2015)
(3) Patsouratis et al. (2005)	(3) Borhan and Zainudin (2016)
(4) Archibald and LaCorbinière (2008)	(4) Chandra and Kumari (2016)
(5) Lelwala and Gunaratne (2008)	(5) Ongan et al. (2017)
(6) Barrie et al. (2009)	(6) Adeola et al. (2017)
(7) Wang (2009)	(7) Akter et al. (2017)
(8) Zainudin and Norul (2010)	(8) Cheng et al. (2017)
(9) Chaiboonsri et al. (2010)	(9) Tavares and Leitão (2017)
(10) Yap (2011)	(10) Fereidouni et al. (2017)
(11) Ibrahim and Ibrahim (2011)	(11) Meo et al. (2018)
(12) Tang (2011)	(12) Muzindutsi and Manaliyo (2018)
(13) Lee (2012)	(13) Khanalizadeh and Ranjandish (2019)
(14) Akar (2012)	(14) Nisthar and Nufile (2019)
(15) Corgel et al. (2013)	(15) Xie and Villace (2020)
(16) Culiuc (2014)	(16) Joun and Kim (2020)
(17) Falk (2014)	(17) Athari et al. (2021)
(18) Kazuzury (2014)	(18) Opstad et al. (2021)
(19) Gan (2015)	

Appendix 2

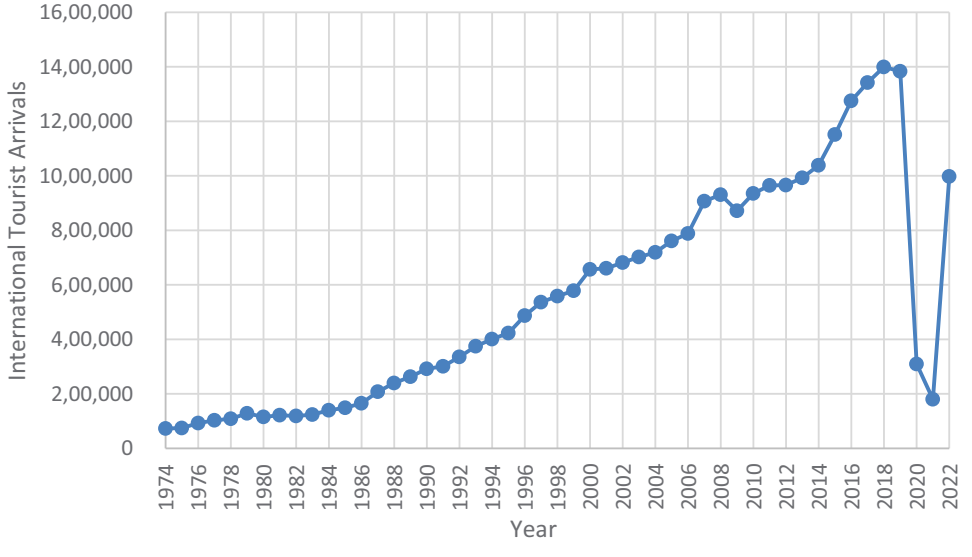

Figure A1. International tourist arrivals to Mauritius (1974–2022).

Appendix 3

$$LTA_t = \gamma + \sum_{i=1}^{p} \beta_{1i} LTA_{t-i} + \sum_{i=1}^{q_1} \beta_{2i} LER_{t-1} + \sum_{i=1}^{q_2} \beta_{3i} LERV_{t-i} + \sum_{i=1}^{q_3} \beta_{4i} LROOM_{t-i} + \sum_{i=1}^{q_4} \beta_{5i} LRP_{t-i} + \sum_{i=1}^{q_5} \beta_{6i} LINCOME_{t-i} + \tau Dummy + \varepsilon_t$$

$$D(LTA)_t = \mu + \underset{p}{\overset{i=1}{\beta_{1i}}} D(LTA)_{t-i} + \underset{q_1}{\overset{i=1}{\beta_{2i}}} D(LER)_{t-1} + \underset{q_2}{\overset{i=1}{\beta_{3i}}} D(LERV)_{t-i} + \underset{q_3}{\overset{i=1}{\beta_{4i}}} D(LROOM)_{t-i} + \underset{q_4}{\overset{i=1}{\beta_{5i}}} D(LRP)_{t-i} + \underset{q_5}{\overset{i=1}{\beta_{6i}}} D(LINCOME)_{t-i} + \tau Dummy + \delta_1 ECM_{t-1} + \varepsilon_t$$

Appendix 4

Table A2. Unit root test.

	At level			At first difference			
Variables	With constant	With a constant trend	Without a constant trend	With constant	With a constant trend	Without a constant trend	Conclusion
LTA	0.0044	0.5557	1.0000	0.0024	0.0008	0.0114	I(1)
LER	0.3388	0.2401	0.6388	0.0001	0.0002	0.0000	I(1)
LERV	0.0000	0.0002	0.0053	-	-	-	I(0)
LROOM	0.0037	0.9748	1.0000	-	0.0000	0.1189	I(1)
LRP	0.2365	0.0018	0.4868	0.0000	-	0.0000	I(1)
LINCOME	0.7368	0.1415	1.0000	0.0006	0.0026	0.0744	I(1)
DUMMY	0.0000	0.0001	0.0000	-	-	-	I(0)

Appendix 5

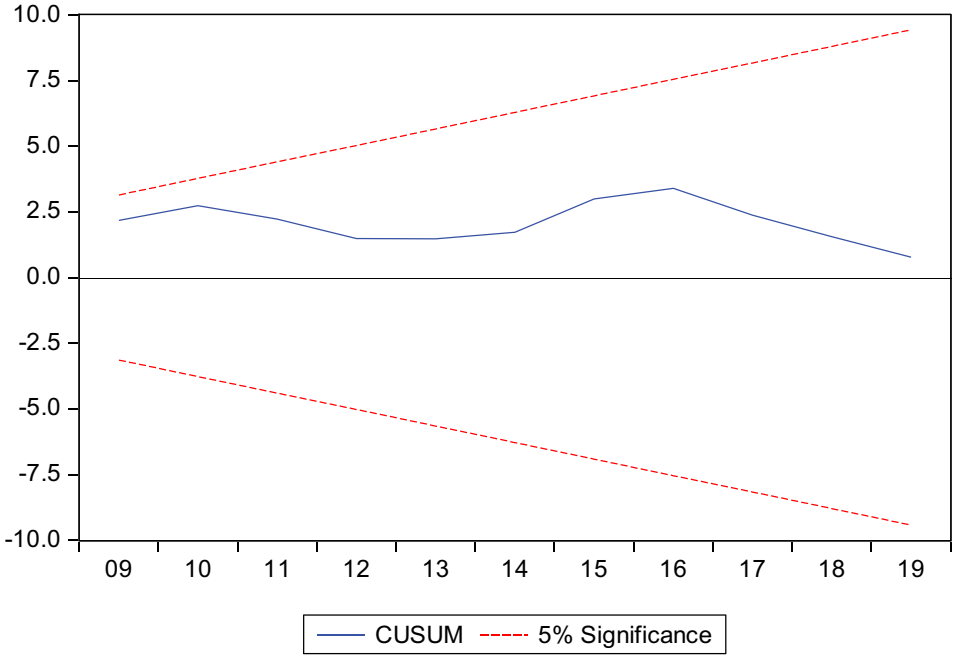

Figure A2. Plot of CUSUM statistics for coefficients stability demand.

Appendix 6

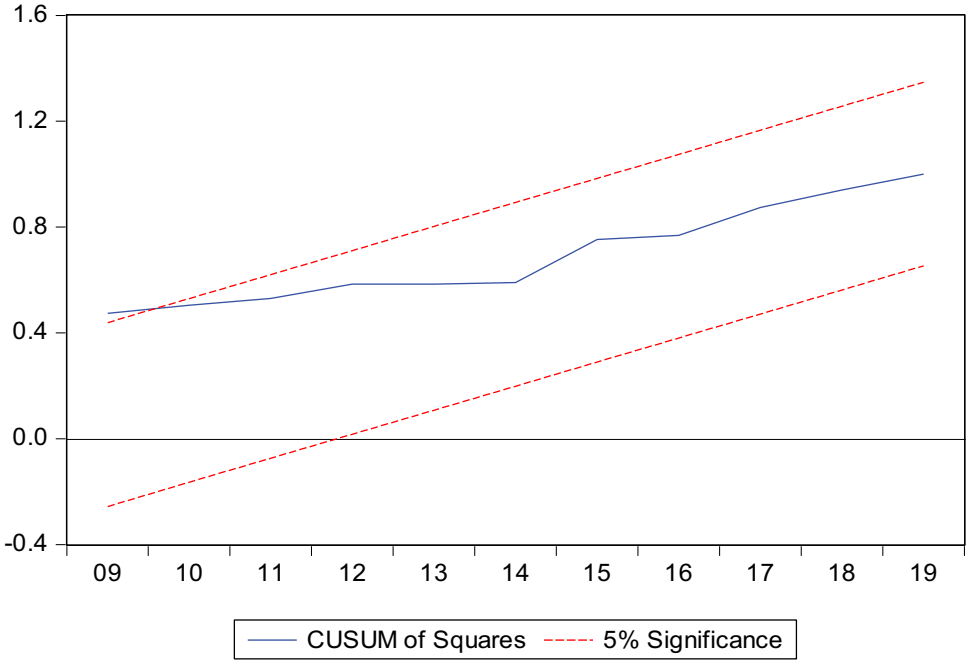

Figure A3. Plot of CUSUM of square statistics for coefficients stability demand.