Testing the relationship between tourism receipts , economic growth and the real effective exchange rate in Algeria during the period (1995 - 2020) using cointegration and Toda yamamoto causality

اختبار العلاقة بين عائدات السياحة، النمو الاقتصادي و سعر الصرف الفعلي الحقيقي في الجزائر خلال الفترة (1995– 2020) باستخدام التكامل المشترك و سببية Toda yamamoto

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Abstract

This study aims to testing and analyzing the relationship between tourism receipts , economic growth and real effective exchange rate in Algeria over the period (1995 -2020), using cointegration and toda yamamoto causality test the johansen cointegration test show that a long run relationship exists between variables, The impact of tourism receipts on economic growth is about 1.571074 % this effect is statistically significant at 5% level also a significant causal relationship in the short run is found from LTRSM and LREER to LGDP at 1% and 5 % level of significant according to toda yamamoto causality test

***Key words**: Tourism , Economic growth , Cointegration , Causality , Algeria*

الملخص :

تهدف هذه الدراسة إلى اختبار وتحليل العلاقة بين عائدات السياحة ، النمو الاقتصادي وسعر الصرف الفعلي الحقيقي في الجزائر خلال الفترة (1995–2020)، وذلك باستخدام التكامل المشترك واختبار السببية لـ Toda yamamoto، أظهر اختبار Johansen للتكامل المشترك وجود علاقة طويلة المدى بين المتغيرات ، بلغ تأثير عائدات السياحة على النمو الاقتصادي حوالي 1.57%، وهذا التأثير ذو دلالة إحصائية عند مستوى 5%، كما توجد علاقة سببية معنوية على المدى القصير عند مستوى 1% و 5 % من لوغاريتم العائدات السياحية ، لوغاريتم سعر الصرف الفعلي الحقيقي الى لوغاريتم الناتج الداخلي الخام.

الكلمات المفتاحية: السياحة، النمو الاقتصادي، التكامل المشترك، السببية، الجزائر

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1. INTRODUCTION

Tourism is one of the fastest growing industries in the world and an important part of economic growth and development strategies, It is the third biggest economic activity in the world after oil and motor vehicles ; so, many countries adopted on tourism for sustainable economic growth (**Sinclair**, **1998**), considered as a source of foreign exchange (currency) necessary to finance the formation of gross fixed capital, which is necessary to increase productive capacity, promote new investment in infrastructure and enhance competitiveness. Reduce unemployment, increase national income and stimulate other economic sectors with direct and indirect impact. It is known as having a positive impact on the increase of economic growth (**Brida**, **2010**), tourism's as well an important operator for local corporations to profit from economies of scale, technology development, a motivation of human capital accumulation (**Brida et al, 2009**)

According to the World Tourism Organization, the number of international tourists coming in 2017 reached about 1 billion and 322 million tourists, a growth rate of 7% over 2016. The number of incoming tourists is expected to reach 2.09 billion by 2028 (**UNWTO, 2017).**

As one of the largest economic sectors in the world, tourism and travel

mainly support economic growth and job creation. In 2017, the total share of tourism and travel in global GDP reached 10.4%, or the US $ 8.272 billion, and the sector provided more than 313 million jobs or 9.9% of total employment. World Travel and Tourism figures also indicate that tourism spending reached $ 1.49 billion, accounting for 6.5% of the world's total exports. Tourism investments amounted to $ 882.4 billion, equivalent to 4.5% for 2017 (**WTTC, 2018**).

In Algeria, despite its natural qualifications, and the great effort made during the initial period of its independence to give the tourism sector the deserved look after, tourism remained among secondary sectors that did not receive the care and support. In spite of the second attempt to promote the sector through the preparation of the guiding plan for tourism development horizons 2025, which is a road to the state to develop tourism in Algeria, but the sector did not know the desired starting point.

Currently, many signs point to a future trend that the tourism sector in Algeria can identify. Despite the deteriorating security conditions surrounding the neighboring countries in the east and south, which directly affect the profitability of one of the most important attractions of Algerian tourism (desert), but the government announced in its program that the tourism sector is one of the priority sectors of the national economy among the five leading sectors.

The aim of this paper is to examine the link between tourism receipts, exchange rates and economic growth on Algeria using Toda-Yamamoto causational relationship over the period 1995-20120

Research problem

The research problem of our study can be formulated as:

Is there a link between tourism receipts , real effective exchange rate and economic growth in Algeria?

Research hypothesis

Based on the research problem we will propose the following hypothesis:

The first hypothesis: there is a cointegration between *tourism receipts , real effective exchange rate and economic growth in Algeria*

The second hypothesis:

there is a bidirectional causal relationship between *tourism receipts , real effective exchange rate and economic growth in Algeria*

2. LITERATURE REVIEW

Most of the last studies are heading to develop growth models in which tourism is a source of currency, stimulating investment, creating employment that ultimately leads to economic growth (Fayissa et al 2007, Mahmoudinia 2011, Ghartey 2013, Mallick et al 2016, Phiri 2016, Muhtaseb 2017).

The economic estimates inspired these works by using a lot of models and economical techniques. The causal analysis has been used by the majority of these experimental studies.

Bilal et al (2010), analyze the impact of international tourism on economic growth in Turkey by reliance on the ARDL approach to Co-integration and Error correction model by using quarterly data. The results revealed there is long-run uni-directional causality running from the volume of international tourism (both the tourist expenditures and tourist arrivals) and real exchange rates to economic growth. Belloumi (2010), provides new evidence on the relationship between tourism receipts, real effective exchange rate and economic growth in Tunisia over the period 1970-2007, Belloumi finds a co-integrating linkage between tourism and economic growth. In addition, the Granger causality test indicates that tourism has a positive impact on gross domestic product growth uni-directionally.

Chor (2012), analyses the dynamic relationship between real tourism receipts, real income and real exchange rates in Malaysia over the period 1974-2009. This study applies the bounds testing approach and error-correction modelling, the results revealed that there is bi-directional causality in the long-run between real tourism receipts and real income, moreover, we also find uni-directional causality running from real exchange rates to real tourism receipts and real income in both short- and long-run.

Hooi, Sio and Chee (2014), examined the impact of tourism on economic growth in Malaysia and Singapore over the period 1980-2009, data includes real GDP, total international trade and exchange rate, their results show that there is no causal nexus between economic growth and tourism expansion in Malaysia and Singapore in the short-run.

Ivana et al (2015), This paper examined the long-run and short-run relationship between tourism, real effective exchange rate and economic growth in Croatia surveyed by using a quarterly data set covering the period 1996-2013, The findings suggests that there is a causality in short-run term

between openness in the economy and gross domestic product, as well as between real effective exchange rate and GDP.

Harun et al (2016), the objective of this paper determines whether a relationship exists between tourism receipts, exchange rate and long-run term economic growth in Turkey during the period 1972-2014 by using Johansen co-integration and Granger causality. This study found out that 1% increase in tourism receipts leads to economic growth by 0.314%.

For the case of Algeria, Benzarour and satour (2017) used the Co-integration and Causal analysis, by studying the long-run link between tourism and economic growth over the period 1995-2014, They showed that tourism has an impact on economic growth uni-directionally.

There are many articles about the relationship between tourism receipts, exchange rates and economic growth. In the literature, as it summarized above. Although, the presented study is similar to them in some perspectives. However, it has a different point of view in the methods teams and analyses used.

The remainder of this paper is structured as follows: The next section describes the data methodology employed in this study: This is followed by results and interpretation. The final section concludes this study.

3. DATA METHODOLOGY AND RESULTS

3.1 . Data and Methodological framework:

Various functional forms have been tested to check the relationship between tourism receipts, exchange rate and economic growth in Algeria. The most appropriate functional forms of the interested variables ware specified as:

3.2 . Type and Sources of Data:

To examine the relationship between tourism receipts, exchange rates and economic growth in Algeria, this research employs annual data during the period 1995-20120 was extracted from the Data Market*. The data availability was the major reason for the time period selection. The sample data include real GDP (dollar), tourism receipts (dollar) and exchange rate (dollar). All the variables are used in logarithmic forms.

As a first stage of the empirical analysis, a unit root test is conducted to determine the stationarity of the time series data. Most of the time series variables are non-stationary, and the use of such data leads to spurious regression, which can't be used to get objective and accurate results from. The order of integration of the variables included in the model is determined by using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests

3.3.The model specification and desctriptive statistics

There are many variables that are essential in explaining Gross domestic product GDP; however it is not possible to include all of them. The variables in this study were chosen because of their importance especially in this, the econometric model is specified as:

$$LGDP = f\ (LGDP_{t-1}\ LTRSM, LREER)$$

$$LGDP = \alpha_0 + \alpha_1 * LGDP_{t-1} + \alpha_1 * LTRSM + \alpha_2 * LREER + U_t \ldots.(1)$$

Table 1: Variables explanation

Variable	***Explanation***
LGDP	Gross domestic product (in ***logarithm***) **source: www.worldbank.org**
$LGDP_{t-1}$	Gross domestic product (in ***logarithm***) lagged one period
LREER	Real effective exchange rate (in ***logarithm***) **source: www.worldbank.org**
LTRSM	Tourism receipts (in ***logarithm***) **source: www.worldbank.org**

Table 2: desctriptive statistics of variables

	GDP	***TRSM***	***REER***
Mean	8.84E+15	214.6923	106.6899
Median	1.10E+16	187.5000	102.0197
Maximum	2.10E+16	473.0000	135.5487
Minimum	4.18E+10	28.00000	91.22158
Std. Dev.	8.38E+15	137.5967	12.05803
Skewness	0.052986	0.228649	0.926103
Kurtosis	1.262628	1.746847	2.680038
Jarque-Bera	3.282166	1.927808	3.827464
Probability	0.193770	0.381401	0.147529
Sum	2.30E+17	5582.000	2773.938
Sum Sq. Dev.	1.76E+33	473321.5	3634.901
Observations	26	26	26

Source : Authors based on Eviews 12

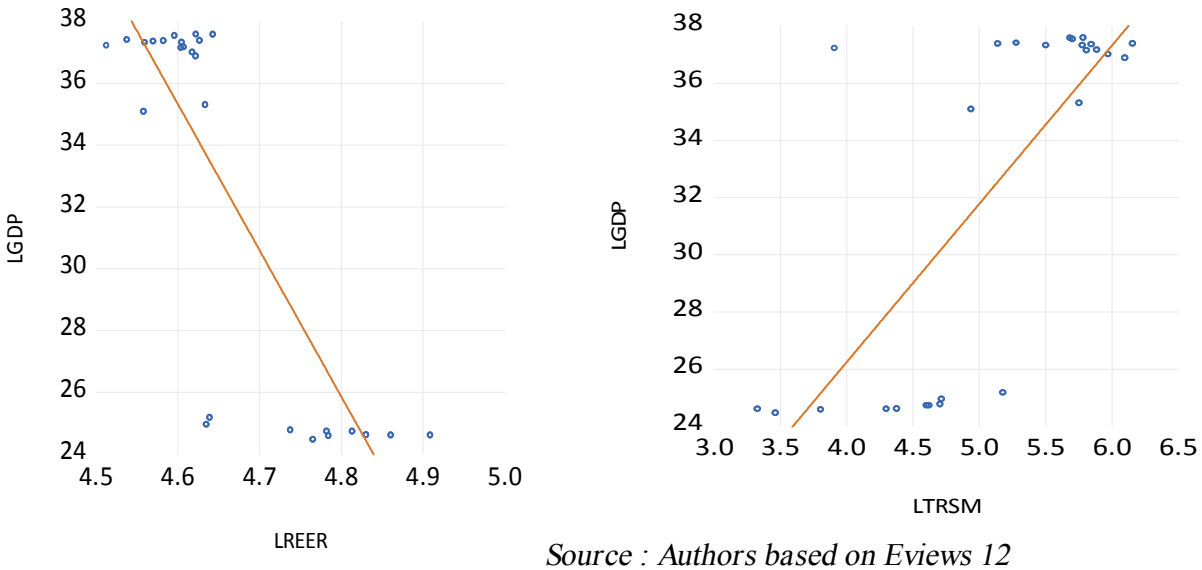
Table 3: *Correlation matrix between variables*

Correlation matrix			
Probability	***GDP***	***TRSM***	***REER***
GDP	**1.000000**		
TRSM	**0.670296 (0.0002)*** **	**1.000000**	
REER	**-0.700068*** (0.0001)**	**-0.572788 (0.0022)*** **	**1.000000**

*****significant at 1% level**

Source : Authors based on Eviews 12

Figure 1: Correlation between variables



Source : Authors based on Eviews 12

From the correlation matrix between variables, we can see that:

The logarithm of tourism receipts *(LTRSM)* is positively correlated with the logarithm of gross domestic product (LGDP) , this relationship is statistically significant at 5 % and 1% level , also the real effective exchange rate is negatively correlated with LGDP at 1 % and 5% level of significance, moreover the correlation between *LTSRM* and *LREER* is negaitive and statistically significant at 1 % level of significance this results are consistent with theoretical background.

3.4.Unit root test

The Augmented Dickey–Fuller (ADF) (1979, 1981) is used to determine the presence of unit roots in the data sets. The ADF test is based on the estimate of the following regression:

$$\Delta X_t = \delta_0 + \delta_1 t + \delta_2 X_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta X_{t-i} + u_i \quad \ldots\ldots\ldots\ldots\ldots\ldots$$

where, Δ is the first-difference operator, X_t is the observations of the series, δ_0, δ_1, δ_2, and α_i are being estimated and u_t is the error term. The null and the alternative hypothesis for the existence of unit root in variable X_t is: H_0:δ_2=0 against H_ε:δ_2<0.

Table 4 : Unit Root Test

Variables	ADF unit root test	
	Level	**First difference**
LGDP	-1.671932 **(0.733)**	-4.959*** **(0.002)**
LREER	-2.2354 **(0.451)**	-4.4785*** **(0.008)**
LTRSM	0.0785 **(0.995)**	-4.5798*** **(0.007)**
	PP unit root test	
	Level	**First difference**
LGDP	-1.7179 **(0.7129)**	-4.9598*** **(0.0029)**
LREER	-2.2354 **(0.4511)**	-4.4599*** **(0.0087)**
LTRSM	2.290224 **(0,998)**	-5.646386*** **(0.0006)**

****the null hypothesis is rejected at 1 % and 5 % level of significance**

Source : Authors based on Eviews 12

The ADF and PP test results showen in table 1 indicates that the null hypothesis of non-stationary at level cannot be rejected for all series, meaning that all series are integrated for order one I (1)

3.5.Johansen co-integration and Toda yamamoto causality test

The Johansen and Julius λ_{trace} cointegration statistic test for testing the null hypothesis that there are at most *r* cointegrated vectors is used versus the alternative Hypothesis of more than *r* cointegrated vectors. Where: λ_{trace} is given by:

$$\lambda_{trace} = -T \sum_{\lambda=r+1}^{k} log(1 - \lambda_i)$$

Where: *T* is the available number of observations and λ_i the eigenvalues. The critical values at 5% significance level are used for testing.

Table 5 : Johansen co-integration test

Hypothesized No. of CE(s)	*Eigenvalue*	*Trace Statistic*	*0.05 Critical Value*	*Prob.***
$H_0 : r = 0$ * $H_1 : r > 0$	0.686733	41.87239	29.79707	0.0013
$H_0 : r = 1$ ** $H_1 : r > 1$	0.396681	14.01558	15.49471	0.0825

the null hypothesis is rejected at 5 percent significance level

****the null hypothesis cannot be rejected at 5 percent significance level***

Source : Authors based on Eviews 12

Table 4 presents the Johansen-Juselius Co-integration test. The result shows that Trace test is statistically significant to reject the null hypothesis of r = 0 at 5% significance level. Therefore, there is one long run co-integration relationship between Gross domestic product and it determinants.

Table 6 : Regression estimation results , LGDP (dependent variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	69.80368**	32.13631	2.172112	0.0414
LGDP(-1)	0.581610***	0.112927	5.150328	0.0000
LTRSM	1.571074**	0.710477	2.211295	0.0382
LREER	-13.72642**	6.201618	-2.213361	0.0381
R^2	**0.900558**	*DW-STAT*		**2.121708**
F-statistic	**63.39305**	*Prob(F-statistic)*		**0.000000*** **
Specification test		**Stat test**		**Probability**
Serial Correlation LM Test:		*F = 0.817067*		*0.4567*
Heteroskedasticity Test: ARCH		*F= 0.691368*		*0.5125*

****significant at 1% level , **significant at 5% level***

Source : Authors based on Eviews 12

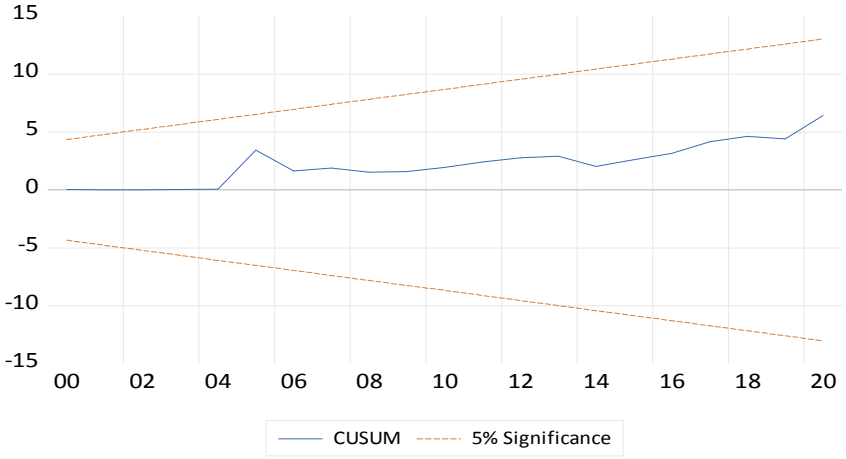
The estimation results of the long run relationship can be interpreted as:

An increase in *LGDP* Lagged one period of 1 % is associated with an increase in the *LGDP* of about 0,58 % and statistically significant at 1 % and 5 % level this result indicates that the gross domestic product increased during the study period

From the estimation results we can see that The impact of tourism receipts is about 1.571074 % this effect is statistically significant at 5% level, this effect confirms the contribution of the tourism sector in the formation of the gross domestic product , this results are consistent with theoretical background. On the other hand, the exchange rate has a significant impact on gross domestic product at 5 % level of significance

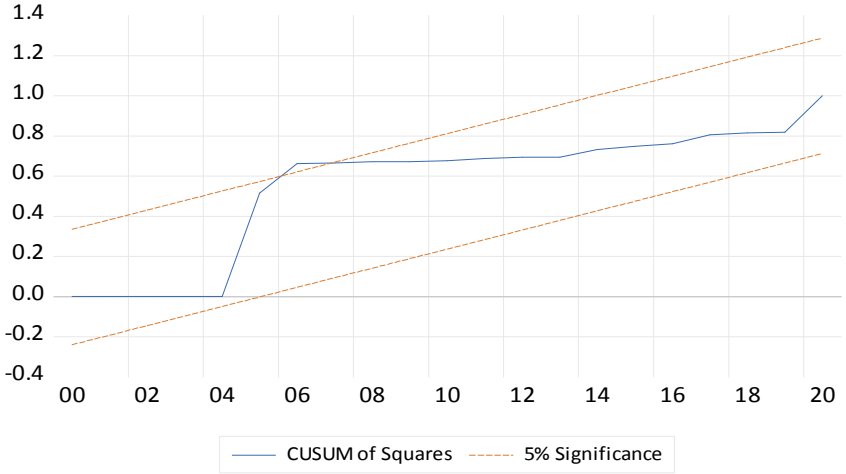
The coefficient of determination R^2 indicates that the model has explained 90% of the changes of the dependent variable. This result indicates a good specification of the model. On the other hand, we note that Durbin Watson's statistic is about 2,21 , meanning that the regression model is not spurious . also we can see that the regression model is statistically significant at 1% and 5 % level according to the *F* statistic test , The diagnostic tests in the short run model do not seem to have any problem.

Figure 2: CUSUM test



Source : Authors based on Eviews 12

Figure 3: CUSUM of squares test



Source : Authors based on Eviews 12

Figures 1 and 2 plot the CUSUM and CUSUM of squares statistic for the error correction model .It can be seen from figure 1 that the plot of CSUSUM stays within the critical 5 % bounds that confirms the stability of coefficients, however CUSUMSQ statistics exceed the 5 critical bounds of parameter stability, thus indicates instability of the coefficients

Table 7 : PP test (residuals)

Variable	PP	0.01	0.05
	Statistic	Critical Value	Critical Value
Residuals	-5.803***	--4,4163	-3.622

***the hypothesis is rejected at 0.01 and 0.05 significance level**

Source : Authors based on Eviews 12

from the unit root test for the long run relationship residuals we conclude that the residuals series is stationary at 0.01 and 0.05 significance level, this result confirm the existence of the cointegration relationships among variables

Table 8 : Toda Yamamoto Causality test

Dependent variable / Independent variable	LGDP	LREER	LTRSM
LGDP		2.002932 (0.3673)	5.545978 (0.0625)
LREER	26.91394*** (0.0000)		2.11676 (0.347)
LTRSM	11.58431*** (0.0031)	3.486528 (0.1749)	

***the hypothesis is rejected at 0.01 significance level**

Source : Authors based on Eviews 12

The Toda Yamamoto Causality tests results suggest that *LREER* , and *LTRSM* Causes *LGDP* at 1 % and 5 % level of significance respectively , Thus , it can be argued that past values of *LREER* , and *LTRSM* contribute to the prediction of the present value of *LGDP* , we conclude that the LGDP in Algeria is influenced real effective exchange rate and tourism receipts in the short run .

4.CONCLUSION

The aims of this paper are to analyses the relationship between tourism receipts, real effective rate rate and economic growth in Algeria over the period (1995 – 2020), we used the cointegration and Toda Yamamoto causality approach, and from this study, we obtained the main following results:

- The economic growth behavior in Algeria is cointegrated with real exchange rate, and tourism receipts , meaning that there is a long run equilibrium relationship between these variables

- The impact of tourism receipts on GDP is about 1.571074 % this effect is statistically significant at 5% level, this effect confirms the small contribution of the tourism sector in the formation of the gross domestic product in Algeria , this results are consistent with theoretical background

- From the results obtained, it can be concluded that the contribution of the tourism sector to the formation of the gross domestic product is small in the Algerian economy, and this is due to the small size of investment in this sector. Therefore, in order to achieve economic diversification, the government must promote the tourism sector.

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Appendices

1. LS estimation

Dependent Variable: LGDP
Method: Least Squares
Date: 08/12/23 Time: 17:54
Sample (adjusted): 1996 2020
Included observations: 25 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	69.80368	32.13631	2.172112	0.0414
LGDP(-1)	0.581610	0.112927	5.150328	0.0000
LTRSM	1.571074	0.710477	2.211295	0.0382
LREER	-13.72642	6.201618	-2.213361	0.0381

R-squared	0.900558	Mean dependent var	32.61175
Adjusted R-squared	0.886352	S.D. dependent var	6.052020
S.E. of regression	2.040236	Akaike info criterion	4.409655
Sum squared resid	87.41384	Schwarz criterion	4.604675
Log likelihood	-51.12069	Hannan-Quinn criter.	4.463745
F-statistic	63.39305	Durbin-Watson stat	2.121708
Prob(F-statistic)	0.000000		

2. Autocorrelation Correlogram

Date: 09/01/23 Time: 15:59
Sample (adjusted): 1996 2020
Q-statistic probabilities adjusted for 1 dynamic regressor

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. *| . |	. *| . |	1	-0.107	-0.107	0.3194	0.572
. *| . |	. *| . |	2	-0.133	-0.146	0.8380	0.658
. *| . |	. *| . |	3	-0.087	-0.123	1.0711	0.784
. *| . |	. *| . |	4	-0.070	-0.123	1.2308	0.873
. | . |	. *| . |	5	-0.058	-0.124	1.3450	0.930
. *| . |	.**| . |	6	-0.160	-0.249	2.2507	0.895
. | . |	. *| . |	7	0.043	-0.095	2.3207	0.940
. |* . |	. | . |	8	0.142	0.026	3.1234	0.926
. *| . |	.**| . |	9	-0.154	-0.236	4.1178	0.903
. |* . |	. | . |	10	0.091	-0.012	4.4887	0.923
. | . |	. *| . |	11	-0.013	-0.105	4.4967	0.953
. | . |	. | . |	12	0.055	-0.028	4.6555	0.969

*Probabilities may not be valid for this equation specification.

3. Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.817067	Prob. F(2,19)	0.4567
Obs*R-squared	1.979891	Prob. Chi-Square(2)	0.3716

4. Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.691368	Prob. F(2,20)	0.5125
Obs*R-squared	1.487317	Prob. Chi-Square(2)	0.4754

4.Johansen Cointegration

Date: 09/01/23 Time: 16:01
Sample (adjusted): 1997 2020
Included observations: 24 after adjustments
Trend assumption: Linear deterministic trend
Series: LGDP LTRSM LREER
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.686733	41.87239	29.79707	0.0013
At most 1	0.396681	14.01558	15.49471	0.0825
At most 2	0.075657	1.888138	3.841465	0.1694

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.686733	27.85682	21.13162	0.0049
At most 1	0.396681	12.12744	14.26460	0.1059
At most 2	0.075657	1.888138	3.841465	0.1694

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.

5 . Toda Yamamoto causality

VAR Granger Causality/Block Exogeneity Wald Tests			
Date: 09/01/23 Time: 16:03			
Sample: 1995 2020			
Included observations: 24			
Dependent variable: LGDP			
Excluded	Chi-sq	df	Prob.
LTRSM	11.58431	2	0.0031
LREER	26.91394	2	0.0000
All	36.68566	4	0.0000
Dependent variable: LTRSM			
Excluded	Chi-sq	df	Prob.
LGDP	5.545978	2	0.0625
LREER	2.116764	2	0.3470
All	7.694822	4	0.1034
Dependent variable: LREER			
Excluded	Chi-sq	df	Prob.
LGDP	2.002932	2	0.3673
LTRSM	3.486528	2	0.1749
All	3.840373	4	0.4280

6- DATA (Log variables)

	LGDP	LREER	LTRSM
1995	24.45530755215532	4.76581958134546	3.465735902799726
1996	24.57216913163599	4.784611525602559	3.80666248977032
1997	24.59816026964207	4.861138947370125	3.332204510175204
1998	24.59837133439554	4.909330951405551	4.30406509320417
1999	24.60772588485024	4.830817680618089	4.382026634673881
2000	24.72678081140801	4.782576341131365	4.624972813284271
2001	24.72594636157479	4.813817111943555	4.605170185988092
2002	24.76210395886271	4.73822670237674	4.709530201312334
2003	24.94076933406806	4.635520668942503	4.718498871295095
2004	25.16982217852761	4.63970924671169	5.181783550292085
2005	36.87284077493135	4.62238257720365	6.102558594613569
2006	36.99859597932204	4.618183534869675	5.973809611869261
2007	37.14129569547002	4.604381369754355	5.811140992976701
2008	37.37786070635541	4.627339036079525	6.159095388491932
2009	37.1577111889217	4.60792391000746	5.88887795833288
2010	37.31888055536398	4.605170185988092	5.780743515792329
2011	37.53457366635227	4.596364099775261	5.703782474656201
2012	37.57880781069397	4.643523437428307	5.68697535633982
2013	37.58213148488211	4.622988968333142	5.786897381366708
2014	35.29869397910449	4.633988697777409	5.755742213586912
2015	37.34805257624653	4.570299725485608	5.849324779946859
2016	37.31157759457554	4.560008367414423	5.505331535932363
2017	37.37256016447862	4.582961783812804	5.14166355650266
2018	37.40046857504527	4.538116605324824	5.283203728737989
2019	35.07970436249312	4.558566604947422	4.941642422609304
2020	37.2180429599191	4.513291483126688	3.912023005428146