ANALYSING THE CASUAL RELATIONSHIP BETWEEN FOREIGN TOURISM ON FOREIGN EXCHANGE EARNINGS

Payal Ghosh
Ph. D. Research scholar, CESP, JNU, New Delhi

Abstract: This paper investigates the casual link between the number of foreign tourist arrival in India and the exchange rate and the foreign exchange receipts thereby generated. It applies Granger causality test under VAR framework.

Keywords: Exchange Rate, Foreign Tourist Arrival, Tourism, VAR.

Introduction: Tourism in India has emerged as an instrument of income, employment generation, poverty alleviation and sustainable human development. It is one of the largest segments under the service sector of the Indian economy contributing 6.23% to the national GDP. It is an important source of foreign exchange earnings in India. This leads to favourable impact on balance of payment of the nation.

Literature Review: Economic theory explains certain economic phenomena and establishes cause and effect relationship between variables. Dritsakis (2010) empirically examined the impact of tourism on the long-run economic growth of Greece by using the causality analysis among real gross domestic product, real effective exchange rate and international tourism earnings. A multivariate autoregressive VAR model is applied for the period 1960 – 2000. Granger causality tests based on Error Correction Models (ECM) indicated that there is a "strong Granger causal" relation between international tourism earnings and economic growth, "strong causal" relation between real exchange rate and economic growth, and simple "causal relation" between real exchange rate and international tourism earnings. While McKinnon shows that tourism can lead to foreign exchange earnings that in turn can be used to finance imports. [2]

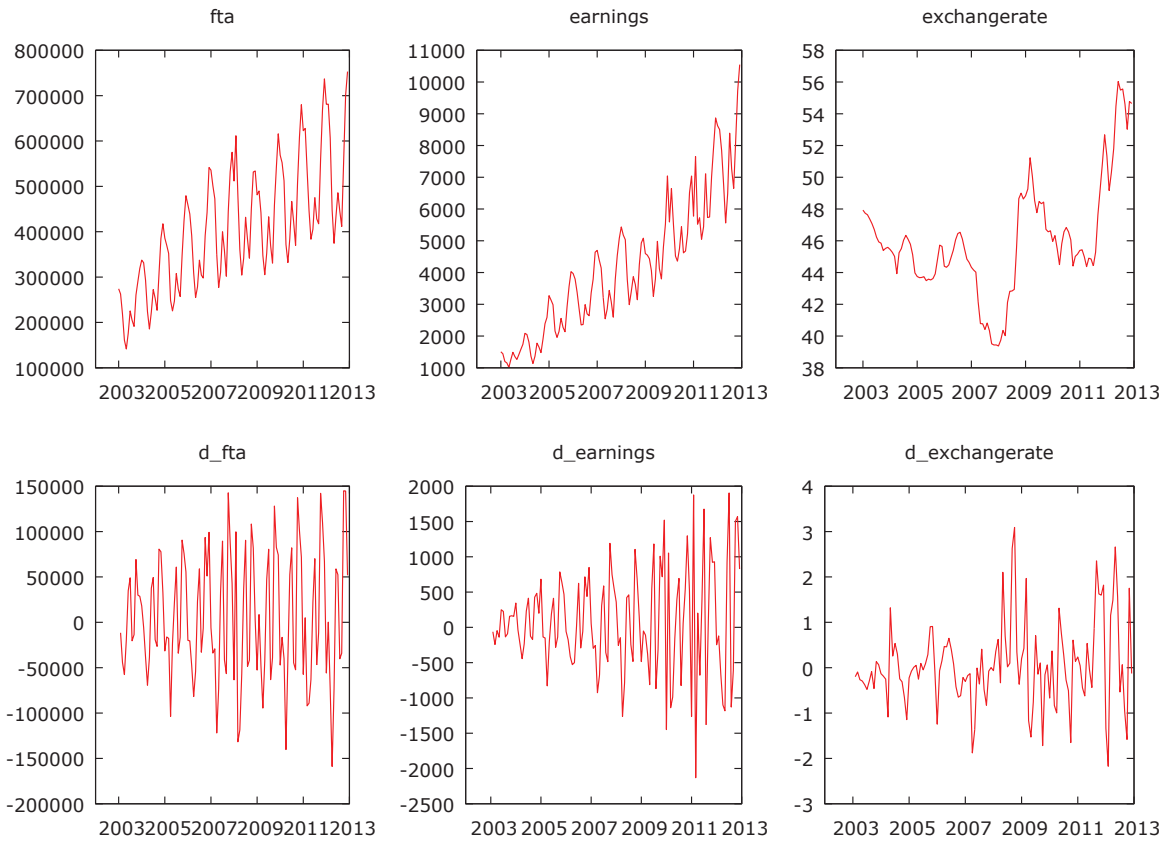
Data and Methodology: This study uses monthly data on number of foreign tourist arrival, average exchange rate and foreign exchange earnings from tourism in India for the period 2003- 2012. The model has been subjected to a number of diagnostic tests to identify potential bias issues that could arise when analysing time series data. Data was obtained from Reserve bank of India bulletin and Indiastat.
To examine the relationship between foreign exchange earnings and the independent variables of foreign tourist arrivals and exchange rate, the study uses the following model:

$$Y_t = \alpha + \beta_1 FTA + \beta_2 exchangerate + u_t$$

Where:
Y_t- foreign exchange earnings from tourism (in Rs. Crores)
u_t– stochastic error term

Results:
Unit Root Test: The time series plot for all the variables were plotted which shows an upward trend, indicating the means of the time series are changing over time. Hence, both series in their original form may not be stationary. To avoid spurious regression problems that may arise from regressing a nonstationary time series on one or more nonstationary time series, we transform the regression model by taking its first difference. The plot of first difference of the variable indicates that the series are integrated of order one, i.e. I (1). Thus, the model is transformed as follows:

$$\Delta Y_t = \alpha + \theta_1 \Delta FTA + \theta_2 \Delta exchangerate + u_t$$



Regression Results: At the levels, both the intercept and the slope coefficient are statistically significant with a high R^2 of 87%. However, the low DW statistics of 0.54 indicates a problem autocorrelation.

$$EARNINGS = -8645.28 + 0.0129496FTA + 163.535exchangerate + u_t$$

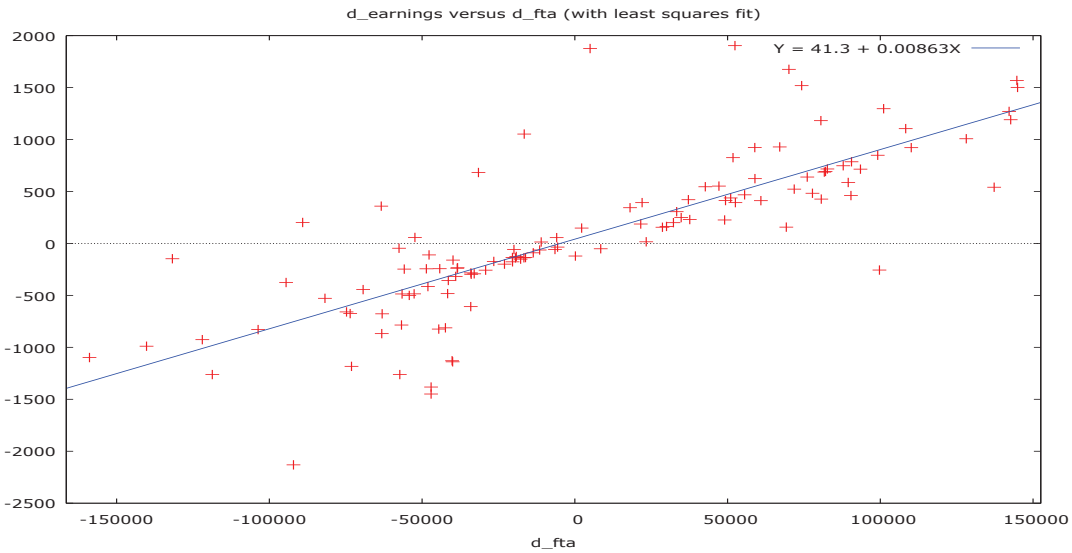
Model 2: OLS, using observations 2003:01-2012:12 (T = 120)
Dependent variable: earnings

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
const	–8645.28	897.033	–9.6376	<0.0001	***
fta	0.0129496	0.000530498	24.4102	<0.0001	***
exchangerate	163.535	20.0899	8.1401	<0.0001	***

Mean dependent var	4141.667	S.D. dependent var	2118.917
Sum squared resid	66898143	S.E. of regression	756.1607
R-squared	0.874790	Adjusted R-squared	0.872650
F(2, 117)	408.7150	P-value(F)	1.63e-53
Log-likelihood	–964.1440	Akaike criterion	1934.288
Schwarz criterion	1942.651	Hannan-Quinn	1937.684
rho	0.715104	Durbin-Watson	0.548482

Testing the model at its first difference yield the following PRF:

$$\Delta Y_t = 40.1806 + 0.0086\Delta FTA + 20.8705\Delta exchangerate + u_t$$



Scatter plot of first difference of FTA and earning

The intercept and coefficient of exchange rate does not seem to be statistically significant (i.e. population parameter is not statistically different from zero at 10% level of significance). While the coefficient of FTA is statistically significant. The R^2 =0.6370 represents that 63% variance in earnings is explained by the model. Durbin Watson d statistics is 3.12 falls outside the acceptable range, thus indicating problem of serial correlation. The Prais-Winston model specification and the inclusion of the linear trend variable were chosen to correct for serial correlation. After PW- CO transformation the Durbin-Watson statistics improved from 0.83 to 2.12.

Source	SS	df	MS
Model	41448069.7	2	20724034.9
Residual	23618372.3	116	203606.658
Total	65066442	118	551410.525

Number of obs	119
F(2, 116)	101.78
Prob > F	0.0000
R-squared	0.6370
Adj R-squared	0.6308
Root MSE	451.23

fdearnings	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
fdfta	.0086105	.0006056	14.22	0.000	.0074109	.00981
fdexchangerate	20.87085	44.59884	0.47	0.641	-67.46277	109.2045
_cons	40.18096	41.50447	0.97	0.335	-42.02387	122.3858

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. dwstat

Durbin-Watson d-statistic(  3,   119) =  3.128451
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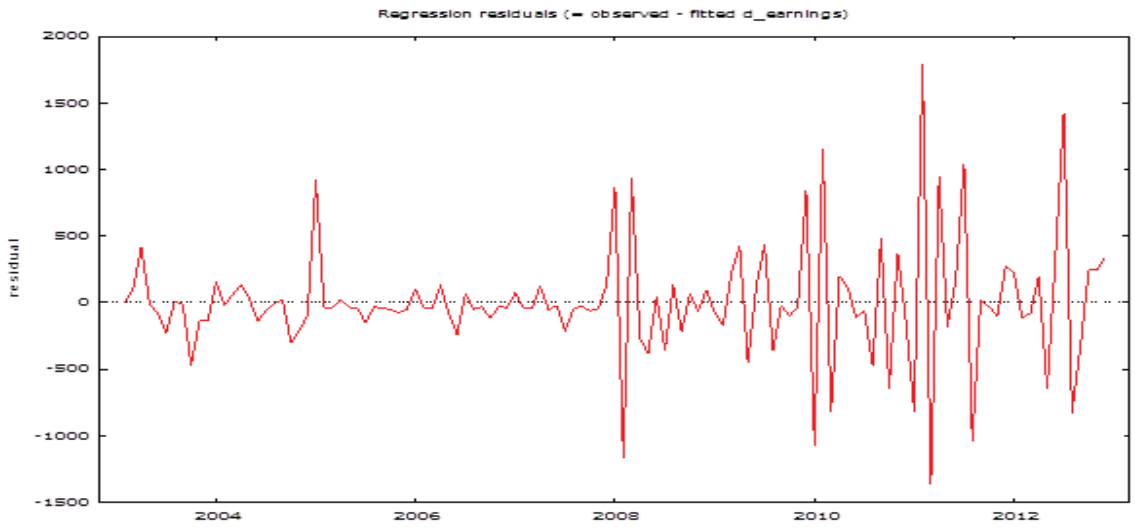
The residual plot shows that the transformed regression does not suffer from serial correlation.



Dickey Fuller Unit Root Test: Dickey- Fuller test is conducted to check for the stationary of the series. This test consists of running a regression of the first difference of the series on the series lagged once. A constant and a time trend may also be included. In this test the null hypothesis is that the series yt is a non-stationary series or it contains a unit root. The null hypothesis is rejected when the calculated DF statistic is less than the critical value or when the test statistic is more negative. The rejection of null hypothesis implies that the series is stationary. Failure to reject the null hypothesis leads to conducting the test on the difference of the series. Therefore, further differencing is conducted until stationarity is reached, i.e. the null hypothesis of presence of a unit root is rejected. The test results are given below show the rejection of null hypothesis in each case.

Dickey-Fuller test for unit root Number of obs = 118

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-7.640	-3.504	-2.889	-2.579

MacKinnon approximate p-value for Z(t) = 0.0000

Dickey Fuller test on FTA Series:

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-7.610	-3.504	-2.889	-2.579

MacKinnon approximate p-value for Z(t) = 0.0000

Dickey Fuller on Exchange Rate Series:

Dickey-Fuller test for unit root — Number of obs = 118

	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
		Interpolated Dickey-Fuller		
Z(t)	-10.712	-3.504	-2.889	-2.579

MacKinnon approximate p-value for Z(t) = 0.0000

Dickey Fuller on Earnings Series: The computed DF test-statistic for dependent and independent variables is smaller than the critical values at 1 percent, 5 percent and 10 percent level of significance, therefore Ho can be rejected. It means that the series do not have a unit root problem and these are stationary at 1%, 5% and 10% level.

4. VAR Analysis: "VARs are dynamic systems of equations in which the current level of each variable in the system depends on past movements in that variable and all the other variables in that system". When we are not confident about whether a variable is exogenous or not, then a VAR can be used. A VAR system can be expressed as follows:

$$Y_t = A_o + A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + \varepsilon_t$$

Where Y_t is a vector of endogenous variables at time t, Ai (i=1, 2 ...p) are coefficient vectors, p is the number of lags included in the system, and ε_t is a vector of residuals. Ao is a vector of intercept terms. Taking two lags the following results were obtained:

Vector autoregression

Sample: 4 - 120 — No. of obs = 117
Log likelihood = -2449.775 — AIC = 42.23548
FPE = 4.42e+14 — HQIC = 42.43675
Det(Sigma_ml) = 3.09e+14 — SBIC = 42.73125

Equation	Parms	RMSE	R-sq	chi2	P>chi2
fdearnings	7	602.506	0.3851	73.28603	0.0000
fdfta	7	60836.3	0.2651	42.20218	0.0000
fdexchangerate	7	.881312	0.1668	23.42595	0.0007

In this case, earnings significantly depend on the first and second lag of foreign tourist arrival. In addition, the foreign tourist arrival significantly depends on the lags of earnings.

Granger Causality: From the analysis so far, we found that both series TOUR and FDI are I(1) and are not cointegrated. Therefore, they have no long-term relationship. They may nevertheless be related in the short-run. Their short-run fluctuation can be described by their first differences, which are stationary. The interactions in the short-run fluctuations may therefore be described by a VAR system in first differences.

The Granger causality test checks whether the lags of one variable enter in to the equation for another variable. This test refers only to the effects of the past values $\{x_t\}$ on the current values ofx_t. If Y_t does not improve the forecasting performance of $\{x_t\}$, then Y_t does not Granger cause $\{x_t\}$. The test actually

measures whether the current and past values of $\{Y_t\}$ help to forecast future values of$\{x_t\}$. The null hypothesis (Ho) in each case is the variable under consideration does not cause the other variable. The following table depicts the results of the Granger causality Wald test:

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
fdearnings	fdfta	68.05	2	0.000
fdearnings	fdexchangerate	1.0996	2	0.577
fdearnings	ALL	69.882	4	0.000
fdfta	fdearnings	8.449	2	0.015
fdfta	fdexchangerate	.45277	2	0.797
fdfta	ALL	9.1651	4	0.057
fdexchangerate	fdearnings	1.5525	2	0.460
fdexchangerate	fdfta	2.8815	2	0.237
fdexchangerate	ALL	4.5829	4	0.333

For testing the null hypothesis that FTA does not cause earnings, the p value is significant, leading to rejection of null hypothesis. Hence we reject the null hypothesis that 'FTA does not cause EARNINGS' in favour of the alternative HA: 'FTA causes EARNINGS'. However, EXCHANGERATE does not granger cause EANINGS. Looking at the second set in the table for the testing of Ho: earnings do not cause FTA, the p-value for this test is 0.015, which is lower than the level of significance 0.10. Therefore, we reject the null hypothesis. Hence EARNINGS granger cause FTA. However, the EXCHANGERATE does not granger cause FTA due to the higher p value of 0.797. For the third set in the table, taking the null hypothesis Ho: Earnings cause exchange rate, p value of .460 is greater than the level of significance. Thus we cannot reject the null hypothesis, implying that EARNINGS does not granger cause EXCHANGERATE. Similarly, the insignificant p values of FTA implies that FTA does not granger cause EXCHANGERATE.

Conclusion: In this paper we investigated the casual relationship between foreign tourist arrival(FTA), exchange rate(EXCHANGERATE) and foreign exchange earnings(EARNINGS) using monthly data for the period 2003:01 to 2012:12. For this investigation, we employed various time series econometric techniques such as unit root test and causality. The analysis reveals that the time series FTA, EXCHANGERATE and EARNINGS are both I(1). We then use the VAR system in first-difference of the variables to investigate the causality between FTA, EXCHANGERATE and EARNINGS. The results show that there is a two-way causal relationship between FTA and EARNINGS. That is EARNINGS has a causal effect on the number of foreign tourist arrivals in India and vice versa.
This shows the positive impact of inbound tourism on foreign exchange receipts and that of the later on former. It is thus recommended that more emphasis must be given to the growth of this sector as it can act as a catalyst for economic growth.

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