THE IMPACT OF EXTERNAL SHOCKS ON TOURISM SECTOR: THE CASE OF KAZAKHSTAN

Yessengali OSKENBAYEV

ABSTRACT

The objective of this study is to assess the temporal impacts on Kazakhstan's tourist arrivals. An econometric strategy is selected to determine the existence of unit roots in data series containing the quarterly number of tourist arrivals between 2000:1 and 2006:3. The present study finds that the data series contain deterministic trend and seasonal components together with detected structural changes. Hence any form of exogenous shocks, will not have permanent impact on Kazakhstan's tourist arrivals.

Key words: Temporal Effects, Kazakhstan, Tourism Industry, Unit Root.

INTRODUCTION

The effect of such external events on the tourism will be temporary if the tourism demand series is trend stationary rather then difference stationary. In the first case, time series evolves around a deterministic time trend and deterministic seasonal components. In the second case, data imitates an unpredictable random walk process and an external shock to this sort of series will have a permanent effect.

We start with a prediction that the impact of external shocks on the tourism industry in Kazakhstan would be temporary. There is no previous study that has attempted to forecast the impact of an exogenous shock on the tourism sector of Kazakhstan. Nevertheless there are some studies for other countries. Enders et al. (1992), for example used the ARIMA model to predict the effect of terrorism on the tourist industry in Western Europe.

Raymond (2001) examines issues relating to the impact of economic factors on tourist expenditure and hotel room occupancy rate. The article first presents an overview of the tourism industry in Hong Kong, an examination of the particular aspects of the tourism industry, and an estimate of tourist spending and hotel room occupancy rates. Using an expectations model, real tourism expenditure is found to depend on expected income, expected exchange rate and price level. The results of the article also reveal that the equilibrium hotel occupancy rate is a function of tourist flows, exchange rates, price level and length of stay.

Au et al (2005) assessed the temporal impact of SARS on the tourists' arrival in Hong Kong. The analysis finds that data series of 24 countries contain unit roots and hence any form of exogenous shocks, like the SARS epidemic, can have

permanent impact on the number of tourist arrivals. The paper recommends that authorities should take source-country-specific measures to overcome the negative effect of SARS.

Bhattacharya and Narayan (2005) provide evidence on the random walk hypothesis for visitor arrivals to India using the recently developed panel unit root tests. Test results allow them to reject the random walk hypothesis, implying that shocks to visitor arrivals to India from the 10 major source markets have a temporary effect on visitor arrivals.

Specifically, the objective of this research is to determine if the impact of external shocks on tourist arrivals in Kazakhstan is temporary or permanent in nature. It is expected that tourists from different countries would act differently to any form of external shocks, and so the impact would vary from one source country to another. By choosing an appropriate econometric strategy we evaluate the impact of external events on tourist arrivals in Kazakhstan. This study also offers methodological contributions to tourism research and future research directions by suggesting a way to quantify arrival patterns with respect to the concept of stationarity and demonstrates the use of method in the case of structural change. Adopting the approach in the present study could empirically evaluate the effects of other tourism crises.

The rest of the paper is organized as follows: The following section explains the methodological strategy we have used. This is followed by a discussion of our findings and finally we end with some concluding remarks.

THE EMPLOYED TIME SERIES METHODOLOGY

We start with a description of the data by a uni-variate time plot. An examination of the time plot may reveal trend and seasonal fluctuations together with possible brakes or structural changes in the process.

In simple terms, a series is said to be stationary if its statistical properties in terms of mean, variance and autocovariances remain constant along the time path. Under such circumstances, any form of external shock will have a transient and diminishing effect on the series, implying that the series will naturally return to its original property over the time. Conversely, a series is said to be non-stationary if it has non-constant mean, variance and autocovariances over the time path. Time series econometricians refer to this type of series as a random walk or unit root

process. Since this type of series does not possess property of stationarity, any exogenous shock will persist and hence the effect on the series will be long-term in nature. In order to determine whether a particular series is stationary or non-stationary, one has to detect whether the data series contains a unit roots in levels and seasonal terms.

There exist a number of procedures for testing the presence of unit root in a data series. Dickey and Fuller's (1979, 1981) ADF approach is a well known approach. This procedure has been elaborated for different cases by some authors. Peron (1989) has offered a formal procedure to test for unit roots in the presence of structural change. A modification of this strategy used by Enders (2005, p.213) and another modification introduced by Hoffmann et al. (2003).

In case of trend and/or seasonality we should start with an assumption of deterministic trend and seasonal components as an alternative hypothesis. In fact this is the course of action followed by Dickey-Fuller (1979) type tests for unit roots. We have employed Peron's procedure that has been outlined in Enders (2004, p.203).

The results of this methodology can be classified in five categories as follows (Au et al 2005):

(1) Stationary–the impact of external shocks would gradually diminish over time. This would imply that in the long run, the number of tourists would return to the original constant level.

(2) Trend-stationary–the impact of external shocks would gradually diminish over time. In this case the number of tourists would return to its long-term trend. Thus, in these cases the impact created by shocks is temporary.

(3) Random walk–the impact of external shocks on non-stationary series would not diminish over time. This would imply that there would be a permanent effect on the number of tourists.

(4) Random walk with a drift–the impact of external shocks on a non-stationary series with a drift behaves exactly the same as (3) except that the series is either drifting upward or downward. The impact of shocks on such a series is permanent.

(5) Random walk with a drift and a trend–the impact of shocks on a non-stationary series with a drift and a trend would not diminish over time. However, since the data series exhibits a trend, both the trend and the shock contribute to the changes in the number of tourists. Although the impact of these shocks on such a series is permanent, the growth in the number of tourists is governed by a trend. Thus, the impact is not as harmful as in (3) and (4).

DATA AND EMPIRICAL FINDINGS

We have selected the number of overnight visits of foreign nationals as a most probable proxy for the tourist numbers of Kazakhstan. The monthly data on foreign arrivals are collected by Statistics Department of Kazakhstan. State Institute of Statistics has tabulated and presented to us.

The overall coefficients are statistically significant and decreasing very slowly over the lag numbers, a case which is an indication of unit roots at levels. Significant coefficients at seasonal periods on the other hand are the indicative of seasonal unit roots.

Although the trend and seasonality are certain components of Kazakhstan's tourist arrivals, we have to start with an assumption that both of these components being deterministic. In Table 1 below we present the most probable deterministic trend and seasonal model together with structural change components. The deterministic trend variable TIME runs as t=1, 2, …, 51, staring from the first quarter of 1993 till the third quarter of 2005. We have employed dummy variable D99 for the 17th August 1999 earthquake taking the value 1, for the third quarter in 1999, zero for all the other periods. Another dummy variable D03 stands for the structural change in constant term, starting from the year 2003 takes the value 1 for all the periods beginning from the first quarter of 2003 till the end of data, and zero for all the periods before 2003. The dummy variable TD03 is an outcome of multiplication TIME and D03 variables and it stands for the structural change in the slope of trend variable TIME. Seasonal dummies D1, D2 and D3 take the value 1 for the quarters 1, 2 and 3 respectively and zero otherwise.

Table 2. Coefficients Estimates of Deterministic Trend and Seasonality

Variables[a]	b	Std. Error	beta	t	P
Const.	14.056	0.046	-	306.323	0.000
TIME	0.0160	0.002	0.426	10.658	0.000
D99	-0.330	0.115	-0.082	-2.876	0.006
D03	-2.028	0.485	-1.501	-4.183	0.000
D1	-0.449	0.044	-0.352	-10.203	0.000
D2	0.345	0.044	0.271	7.870	0.000
D3	0.716	0.045	0.561	15.962	0.000
TD03	0.0483	0.011	1.651	4.567	0.000

NOTES: a:Dependent Variable: LNTURS. b: Unstandardized Coefficients. beta: Standardized Coefficients, Adjusted R-square: 0.962, DW Statistic: 1.556.

An examination of the estimation results presented in Table 2 above reveals that, all the individual parameter estimates are of high quality in that all the estimates statistically different from zero even in 1 % significance level. In spite of such a large number of parameters in the model, the adjusted coefficient of determination is still at a high level of 96th percentile. Durbin-Watson lower and upper critical values for the number of observation 50 and number of parameters 7 except constant term are 1.246 and 1.875 (Gujarati 1995, p.818). In the present model DW statistic exceeds the lower bound. We cannot comfortably accept the null hypothesis of no auto-correlation for the residuals of this model. DW statistic 1.556 is in between lower and upper critical values, that is, we are on the left inconclusive area. We have to elaborate on the autocorrelation or unit tests. Therefore we perform HEGY test for seasonal unit roots and DF test non-seasonal unit roots for the residuals of the estimated model.

To perform HEGY test for seasonal unit roots we have constructed variables , , and from the residuals of deterministic model as outlined in step 3 of Table 1. Then we have estimated the auxiliary regression of HEGY test and its restricted form for . The results are presented in Table 3 below.

Table 3. Parameter Estimates of HEGY Regressions

Models[1]	Variables[2]	Parameter Estimates	Standard Errors	t Statistics	p
Unrestricted		-0.130	0.055	-2.346	0.024
		-0.388	0.090	-4.292	0.000
		0.046	0.100	0.468	0.642
		-0.250	0.097	-4.370	0.000
Restricted		-0.128	0.065	-1.971	0.055
		0.398	0.106	3.747	0.001

NOTES: (1) Linear Regressions through the Origin (2) Dependent Variable: .

Here only third parameter in the unrestricted model seems to be not significant. Dropping the third seasonal variable, the same model could be re-estimated. However, as far as restricted F test is concerned, test statistic will not be biased. In fact HEGY test does not have any provision for that sort of model estimates. Hence we go forward to perform the restricted F test for seasonal unit roots.

Table 4. The Results of HEGY Seasonality Regressions

Regressions	Residual Sum of Squares	Degrees Freedom	of Durbin Watson	R Square

Unrestricted	0.392	43	2.00	0.51
Restricted	0.569	45	1.90	0.29

Restricted and unrestricted residual sum of squares are 0.569 and 0.392, number of restrictions is 2, number of observations is 49, and number of parameters in full model is 4. Hence the calculated value of F statistic is

=10.172

The critical value reported by Hylleberg et al (1990) is 3.08. As the test statistics exceeds the critical value, we reject the null hypothesis. Therefore no seasonal unit roots have been detected. According to the t-statistics given in Table 3 for the non-seasonal and semi-annual unit root parameters, null hypothesis of unit roots should be rejected. However these ordinary t-statistics are not robust. Hence we should apply DF test for non-seasonal unit roots. DF test results are presented in Table 4.

Table 5. Dickey-Fuller Unit Root Test for Levels

Variable[a]	Coefficient	Std. Error	t-Statistic	Prob.	DW	AIC
e_{t-1}	-0.780820	0.140049	-5.575330[b]	0.0000	1.968608	-1.749835

NOTES: (a) Dependent Variable: $\Delta_4 e_t$, (b) DF Test Statistic, MacKinnon (1991) critical values for rejection of hypothesis of a unit root are -2.61, -1.95 and -1.62 for 1, 5 and 10 % significance levels respectively. Sample (adjusted): 1993:2 2005:3 Included observations: 50 after adjusting endpoints

Durbin-Watson statistic being close to 2, shows that there is no autocorrelation structure in this auxiliary regression. As the test statistic -5.57 is less than critical value -2.61, we reject the null hypothesis of non-seasonal unit roots. Peron (1989) reports a critical value of -4.24 for λ=0.5, the proportion of the observations occurring prior to the break. This is the point when the maximum difference between the two statistics occurs at 5 percent significance level. Our test statistic exceeds the Peron's critical value in absolute terms as well, pointing out again that, there is no unit root.

CONCLUSION

Testing for unit root hypothesis, which asserts that a series is a non-stationary process, in the case of tourist arrivals has important implications for policy makers. If, for instance, visitor arrivals are characterized by a unit root, then it implies that shocks to visitor arrivals are permanent. However, if visitor arrivals are without a unit root, this implies that shocks to visitor arrivals are temporary. This study provides evidence on the unit root hypothesis for tourist arrivals to Kazakhstan in case of structural change, using a modification of the previous methods. The test

results allow us to reject the null of unit root hypothesis, implying that external shocks have a temporary effect on Kazakhstan's tourist arrivals.

It must be noted that our analysis uses total tourist arrivals. Future research could consider the effect of shocks to individual nationalities and on particular classification of tourists, for instance business travelers, backpackers, group travelers etc. For instance, using panel data for several important sources of demand for Kazakhstan's tourism over a number of years, a panel unit root test may reveal more reliable results.

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Түйін

Бұл мақалада маусымдық экономикалық өзгерістердің Қазақстан туризм секторына әсері талқыланады. Бұл орайда эконометрикалық модельдің нәтижесі бойныша экзогендік шоктардың туризм секторына тұрақты әсер етпейтіндігі анықталды

Резюме

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Özet

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