Modelling Multivariate Shocks in International Tourist Arrivals to the Maldives

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EXTENDED ABSTRACT

The Indian Ocean tsunami of 26 December 2004 made clear the devastating short term impact in lost lives, as well as the longer term impact in lost livelihoods and an uncertain future. Tourism was one of the more obvious non-human casualties of this tragic natural phenomenon.

In the Maldives, although there were fewer fatalities compared with other countries in the Indian Ocean that were affected by the tsunami, there was widespread damage to housing and infrastructure. As a result, 14 islands out of the 200 inhabited islands were made completely uninhabitable. Approximately 5% of the population was displaced, a quarter of the tourist resorts were closed, and 8% of fishing boats were damaged. The two most important economic sectors of the Maldives are tourism and fisheries.

Tourism is the principal economic activity in the Maldivian economy, accounting for more than 30% of GDP, more than 60% of foreign exchange earnings and employs 17% of economically active labour force. As over fifty-five percent of government tax revenue arises from tourism-related levies and charges, monthly government budget financing depends largely on international tourist arrivals. Therefore, monitoring of daily, weekly and monthly international tourist arrivals is essential for fiscal policy evaluation and the assessment of the balance of payments. Over 600,000 tourists visited the Maldives in 2004. The authorities estimate that GDP growth in 2005 will be 5 percentage points lower than the original estimate of 6%, although this estimate is subject to considerable uncertainty. The net losses to the balance of payments are estimated at approximately USD 160 million which accounts for 19% of GDP. The Government of Maldives with the assistance of the World Bank, Asian Development Bank and United Nations estimated the replacement cost of damaged infrastructure at around USD 400 million which is about 50% of GDP. The bulk of the estimated cost of repairing the damage to tourist resorts, which amounts to over USD 100 million will be covered by insurance. However, the responsibility of reconstruction of the necessary infrastructure and rehabilitation of the displaced population falls on to the government budget which is estimated at about USD 110 million or 13% of GDP. As a result of the negative impact on tourist arrivals, it is anticipated the revenue short fall will be around 5% of GDP. This paper examines the time series properties of weekly international tourist arrivals to the Maldives from ten major tourist source countries, namely Italy, Germany, UK, Japan, France, Switzerland, Austria, the Netherlands, Russia and Spain. The period of analysis is from 1 January 1994 to 31 July 2005. Daily international tourist arrivals figures obtained from the Ministry of Tourism of Maldives are aggregated to weekly international tourist arrivals. The associated uncertainty is estimated for the ten principal tourist source countries. Univariate and multivariate time series models of conditional volatility (or predictable uncertainty) are estimated and tested.

The short run or the ARCH effects and long run or the GARCH effects from the respective tourist source countries reveal that except for Italy and Japan, weekly tourist arrivals to the Maldives from all of the tourist source markets are affected significantly by their own short and long run effects. Furthermore, the long-run impacts of weekly tourist arrivals from Germany and Switzerland are most influential on rest of the tourist source countries examined in this paper. The conditional correlations obtained from the VARMA-GARCH model are estimated and examined to ascertain whether there is specialization, diversification or segmentation in the international tourism demand shocks from the ten major tourism source countries to the Maldives. The estimated conditional correlations for weekly international tourist arrivals were found to be significantly different from zero, but also relatively low. This indicates that the government of the Maldives and the major tour operators that organize tourist vacations have to emphasize their marketing efforts independently of each tourist source country.

1. INTRODUCTION

The Indian Ocean tsunami of 26 December 2004 made clear the devastating short term impact in lost lives, as well as the longer term impact in lost livelihoods and an uncertain future. Tourism was one of the more obvious non-human casualties of this tragic natural phenomenon. Tourism is the principal industry in the Maldives, accounting for more than thirty per cent of GDP and more than sixty per cent of foreign exchange earnings. As over fifty-five percent of government tax revenue arises from tourism-related taxes, and monthly government budget financing depends largely on international tourist arrivals, the monitoring of daily, weekly and monthly international tourist arrivals is essential for fiscal policy evaluation. Over 600,000 tourists visited the Maldives in 2004.

This paper examines the time series properties of monthly international tourist arrivals to the Maldives from ten major tourist source countries, namely Italy, Germany, UK, Japan, France, Switzerland, Austria, the Netherlands, Russia and Spain from 1 January 1994 to 31 July 2005. Weekly international tourist arrivals and the associated uncertainty are estimated for the ten principal tourist source countries. Univariate and multivariate time series models of conditional volatility (or uncertainty) are estimated and tested.

The conditional correlations are estimated and examined to ascertain whether there is specialization, diversification or segmentation in the international tourism demand shocks from the major tourism source countries to the Maldives. The estimated conditional correlations for the weekly international tourist arrivals were found to be significantly different from zero, but also relatively low. This indicates that the government of the Maldives and the major tour operators that organize tourist vacations have to emphasize their marketing efforts independently of each tourist source country.

The plan of the paper is as follows. Section 2 gives an appraisal of the short-term economic development of the Maldives for the period 2001-2004, followed by an economic impact evaluation of the 2004 Boxing Day tsunami in Section 3. Section 4 illustrates multivariate models of volatility in international tourism. This can also be interpreted as an application of financial Value-at-Risk (VaR) models. The empirical results and their implications for policy making and marketing are discussed in Section 5. Some concluding remarks are given in Section 6.

2. ECONOMIC DEVELOPMENT

The economic performance in the Maldives in recent years has been strong. Over the three years since 2001, the annual average real GDP growth has been around 8% owing to growth in international tourism and fisheries. Just before the 2004 Boxing Day tsunami struck, the United Nations was to decide that the Maldives be graduated from LDC status to a developing country.

Annual inflation had been falling for some years but had increased in 2004 due to higher prices of fish and domestically produced foodstuffs. Domestic credit has increased over the same period mainly due to the increase in lending to investment in eleven new tourist resorts. Hence, there was a 33 percent increase in broad money.

In the fiscal account, the current expenditure continued to rise due to sustainability of increase in development infrastructure such as schools and healthcare facilities in the outer atolls, but the fiscal deficit has fallen during the last two years. This increase in current expenditure has been balanced through lower capital expenditure, higher revenue from expanding tourism sector accounting for increase in tourism tax and import duties. Furthermore, in November 2004 the government increased the per capita tourism tax from USD 6 to USD 10, which was last revised in 1988. The overall budget deficit remained at a comfortable level of 2.8 percent of GDP at the end of 2004.

On the external front, the current account deficit broadened in 2004 accounting for 12% of GDP, but the foreign exchange reserves increased. The widening of the current account was due to sharp increases in imports of consumption and investment goods for the expanding tourism sector and the increasing oil price. Nevertheless, this was offset by the increase in foreign exchange earnings from tourism and fisheries. Furthermore, growth in private capital inflows enabled the economy to accumulate the stock of foreign exchange reserves to finance on average three and half months of imports. The external debt of the Maldives has been growing in US Dollar terms during the same period under analysis and recorded 42% as a proportion of GDP at the end of 2004.

3. IMPACT OF THE 2004 TSUNAMI

The 2004 Boxing Day tsunami had a destructive effect on the Maldives. The loss of life in the Maldives was limited compared with other

countries affected in the Indian Ocean, but there was widespread damage to housing and infrastructure with approximately 5% of the population homeless. The initial damage assessment revealed it would cost about USD 400 million (about 50% of GDP) to recover the damage to pre-tsunami level.

Prior to the tsunami stuck the prospects for 2005 were promising with an estimated real GDP growth of 6.5% reflecting continued growth in international tourist arrivals and fish catch due to partial-liberalization of fisheries sector. Moreover, the increase in revenue arising from the continued growth in the economy and additional planned revenue measures such as the introduction of a Business Profits Tax would have allowed the government to finance its planned development expenditure without difficulty.

The policy target of the government was to increase foreign exchange reserves over the medium term, bearing in mind the economy's vulnerability to unanticipated external shocks due to its overwhelming dependence on international tourism. Due to the severity of the impact of the tsunami, the estimated real GDP growth has been sharply reduced. This is because the tourism sector is severely affected with 20 out of the 87 tourist resorts temporarily closed. The capacity utilization rate for the first 6 months of 2005 has been below 45%, compared with 66% for the same period in 2004. It is anticipated that all resorts that have been closed will be fully operational by the end of 2005 and will restore the normal capacity utilization rates. However, this would still record a 30% short fall in tourism revenue compared with 2004.

The liberalization of the fisheries sector, which accounts for the largest share of merchandise exports will be hampered due to destruction of fishing vessels, fish freezing and processing facilities. Ancillary industries such tourist transfer services and resort supply services have been extensively affected. Nevertheless, it is anticipated that the construction, transport and communications sectors will benefit out of the reconstruction effort.

Taking the above into consideration, the authorities anticipate a modest real GDP growth of 1%, if not a recession. It is also likely that there would be a short term increase in prices, because the bulk of consumption in Maldives constitutes imports. Moreover, prices of construction materials are also anticipated to increase due to supply constraints. The increase in spending needs coupled with the reduction in revenue will result in widening the budget deficit.

The short term disaster relief and reconstruction costs are estimated at USD 110 million and will have to be financed through domestic sources. The reduction in international tourist arrivals will lower tourism tax revenue. The budget deficit will be partly financed through new grants-in-kind from donor countries. In spite of this, the budget deficit will increase dramatically. In addition to that there will be substantial adverse impact on the balance of payments. The current account deficit is anticipated to double to 25% of GDP in 2005, owing to the sharp decline in foreign exchange earnings from tourism and increased importation of intermediate and capital goods for the entire post-tsunami reconstruction effort.

4. MULTIVARIATE MODELS OF VOLATILITY

The aim of the paper is to model the weekly international tourist arrivals to the Maldives from its 10 main tourist source countries namely, Italy, Germany, UK, Japan, France, Switzerland, Austria, the Netherlands, Russia and Spain from 1 January 1994 to 31 July 2005. This approach is based on Engle's (1982) development of time-varying volatility (or uncertainty) using the autoregressive conditional heteroskedasticity (ARCH) model, and subsequent developments associated with the ARCH family of models. McAleer (2005) gives an extensive review of univariate and multivariate models of conditional volatility including detailed discussions of the regularity conditions as required for sensible empirical practice.

The following presentation of the theoretical background closely follows Hoti, et al. (2005). Consider the following specification for weekly tourist arrivals for the Maldives, y_t:

$$\begin{aligned} y_t &= E\left(y_t \mid \Im_{t-1}\right) + \varepsilon_t, \qquad t = 1,...,n \\ \varepsilon_t &= D_t \eta_t \end{aligned} \tag{1}$$

where $y_t = (y_{1t},...,y_{mt})'$ measures weekly tourist arrivals for the Maldives; $\eta_t = (\eta_{1t},...,\eta_{mt})'$ is a sequence of independently and identically distributed (*iid*) random vectors that is obtained from standardising the shocks to weekly tourist arrivals, ε_t, using the standardisation $D_t = diag(h_{1t}^{1/2},...,h_{mt}^{1/2})$, where h_t is conditioned on (that is, determined by) historical data, as discussed below; $\Im_t$ is the historical information at time t that is available to tourists, tourism service providers and policy makers; $m\,(=10)$ is the number of weekly data series, namely weekly tourist arrivals for the 10 main tourist source

countries for the Maldives; and $t = 1,...,522$ weekly observations from 1 January 1994 to 31 July 2005.

The constant conditional correlation (CCC) GARCH model of Bollerslev (1990) assumes that the conditional variance of the shocks to the four data series i, $i = 1,...,m$, follows a univariate GARCH(*r*,*s*) process, that is,

$$h_{it} = \omega_i + \sum_{l=1}^{r} \alpha_{il} \varepsilon_{it-l}^2 + \sum_{l=1}^{s} \beta_{il} h_{it-l} \qquad (2)$$

where α_{il} represents the ARCH effects, or the short run persistence of shocks (namely, an indication of the strength of the shocks in the short run) to weekly tourist arrival i, and β_{il} represents the GARCH effects, or the contribution of such shocks to long run persistence (namely, an indication of the strength of the shocks in the long run). This model assumes the independence of conditional variances, and hence no spillovers in volatility, across the ten data series. Moreover, CCC does not accommodate the (possibly) asymmetric effects of positive and negative shocks on the conditional volatility of weekly tourist arrivals to the Maldives. It is important to note that Γ is the matrix of constant conditional correlations of standardized shocks to weekly tourist arrivals, with the typical element of Γ being given by $\rho_{ij} = \rho_{ji}$ for $i, j = 1,...,m$. Therefore, the multivariate effects are determined solely through the constant conditional correlation matrix.

Equation (2) assumes that a positive shock ($\varepsilon_t > 0$) to weekly tourist arrivals has the same impact on uncertainty, h_t, as a negative shock ($\varepsilon_t < 0$), but this assumption is often violated in practice. An extension of (2) to accommodate the possible differential impact on uncertainty from positive and negative shocks to weekly tourist arrivals, is given by

$$h_{it} = \omega_i + \left(\sum_{l=1}^{r} \alpha_{il} + \sum_{l=1}^{r} \gamma_{il} I(\eta_{it-l}) \right) \varepsilon_{it-l}^2 + \sum_{l=1}^{s} \beta_{il} h_{it-l} \quad (3)$$

in which $\varepsilon_{it} = \eta_{it} \sqrt{h_{it}}$ for all i and t, and $I(\eta_{it})$ is an indicator variable such that

$$I(\eta_{it}) = \begin{cases} 1, & \varepsilon_{it} < 0 \\ 0, & \varepsilon_{it} > 0 \end{cases}.$$

As in (1), $\eta_t = (\eta_{1t},...,\eta_{mt})'$ is a sequence of *iid* random vectors, with zero mean and covariance matrix Γ, so that $\varepsilon_t = D_t \eta_t$, in which D_t depends only on $H_t = (h_{1t},...,h_{mt})'$.

As an extension of (3) to incorporate the effects of shocks across weekly tourist arrivals of the 10 tourist source countries, and hence spillover effects in uncertainty across the ten data series, it is necessary to define h_{it} on the basis of past information from ε_{it}, ε_{jt}, h_{it} and h_{jt} for $i, j = 1,...,m$, $i \neq j$. Thus, the asymmetric VARMA-GARCH, or VARMA-AGARCH, model of Hoti, Chan and McAleer (2002) is defined as follows:

$$\Phi(L)(Y_t - \mu) = \Psi(L)\varepsilon_t \qquad (4)$$

$$\varepsilon_t = D_t \eta_t$$
$$H_t = W + \left(\sum_{l=1}^{r} A_l + \sum_{l=1}^{r} C_l I(\eta_{t-1}) \right) \varepsilon_t + \sum_{l=1}^{p} B_l H_{t-l} \qquad (5)$$

where $D_t = diag(h_{1t}^{1/2},...,h_{mt}^{1/2})$, A_l, C_l and B_l are matrices with typical elements α_{ij}, γ_{ij} and β_{ij}, respectively.

The CCC model (1)-(2) is obtained from (4)-(5) by setting $A_l = diag\{\alpha_{il}\}$, $B_l = diag\{\beta_{il}\}$ and $C_l = 0$ for $l = 1,...,r$, while the VARMA-GARCH model is obtained from (4)-(5) by setting $C_l = 0$ for $l = 1,...,r$.

5. CHARACTERISITICS OF DATA

In this paper, weekly international tourist arrivals data provided by the Ministry of Tourism of Maldives from the 10 major tourist sources countries during the period 1 January 1994 to 31 July 2005 are examined and illustrated in Figure 1. An examination of the Phillips-Perron unit root test for stationarity, with truncated lags of order 5 for each of the ten series in levels, rejected the null hypothesis that there is a unit root in the series at 1%, 5% and 10%. Furthermore, there are clear signs of strong seasonality with the peak tourist season in the Maldives coinciding with the European winter months. Furthermore, weekly tourist arrivals from UK, Italy, Austria and Japan have shown increasing trends and for all of the series the adverse impact of the tsunami are quite visible.

6. EMPIRICAL EVALUATION AND IMPLICATIONS

To estimate the conditional variance h_t accurately, it is important to obtain relatively precise estimates of the conditional shocks, ε_t. After careful examination of the time series properties of the series, an ARMA(*p*,*q*) model with 12 seasonal dummy variables, linear and

non-linear time trends and a structural break dummy variable for the tsunami disaster during the last week of December 2005 fit the data reasonably well.

The empirical estimates are obtained using the Berndt, Hall, Hall and Hausman (BHHH) (1974) algorithm using the EViews 4.1 software package. Table 1 reports the estimates for the VARMA-GARCH model for the 10 main tourist source countries to the Maldives. The estimates for the conditional mean reveal that there is significant habit persistence, which is consistence with the literature on empirical tourism demand.

Except for Italy and Japan weekly tourist arrivals to the Maldives from all of the other tourist source markets are affected significantly by their own short and long run effects. In the case of Italy, it is only the short run impact that affects while, for Japan it is the long run shock which affects weekly tourist arrivals from these two tourist sources.

The spillover effects between the tourist source countries reveal that weekly tourist arrivals from each source country are influenced in the short run and the long run. The most significant spillover effects are visible for weekly tourist arrivals from the Netherlands. All the source countries except UK affect Dutch tourist arrivals to the Maldives. Weekly tourist arrivals from Russia are least affected by arrivals from the other tourist sources because it is the largest emerging market. The long-run impact of German and Swiss tourist arrivals are most influential on tourist arrivals from the other tourist source countries, because historically these two sources are very dominant in the composition of tourist arrivals to the Maldives.

Using the estimated standardized shocks to weekly tourist arrivals obtained from the VARMA-GARCH model, the conditional correlations are obtained and given in Table 2. The estimated static conditional correlations for the weekly international tourist arrivals were found to be significantly different from zero, but also relatively low. This indicates that the government of the Maldives and the major tour operators that organize tourist vacations have to emphasize their marketing efforts independently of each tourist source country.

7. CONCLUSION

The impact of the 2004 Boxing Day tsunami had disastrous impact on the economy of the Maldives which overwhelmingly relies on tourism. This paper examined the conditional volatility of weekly international tourism arrivals from the 10 main tourist source countries to the Maldives. The empirical results show that the marketing efforts by the government and tour operators in the 10 source markets examined should be conducted independently.

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Table 1: VARMA-GARCH Weekly Tourist Arrivals Spillover Effects for the Ten Main Tourist Source Countries for the Maldives

TOURIST SOURCE COUNTRY	CONDITIONAL MEAN		CONDITIONAL VARIANCE																				
			Own Effects			Spillover Effects																	
Italy	AR(1)		ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.70		**6635.39**	**0.48**	**-0.01**	**0.96**	**1.14**	**-0.11**	**-0.43**	**-0.03**	**2.12**	**-0.05**	**-0.22**	**0.22**	**1.68**	**4.89**	**10.03**	**-2.24**	**-2.61**	**0.24**	**-0.12**	**3.51**	**-3.70**
	9.07		0.16	2.92	-0.09	1.50	1.13	-0.94	-1.87	-0.05	1.07	-0.40	-0.76	0.85	1.66	1.93	1.76	-0.70	-0.38	1.18	-4.14	1.20	-0.95
	4.84		0.20	3.94	-0.14	1.61	1.32	-1.77	-4.40	-0.11	1.60	-0.82	-1.45	1.56	1.65	2.39	2.24	-2.79	-1.18	1.08	-5.50	1.70	-2.64
Germany	AR(1)		ω	α	β	α_{FR}	β_{FR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.49		**30453.59**	**0.13**	**0.68**	**-0.03**	**-0.04**	**-9.3E-04**	**-3.0E-03**	**-0.08**	**0.40**	**-0.02**	**-0.05**	**0.01**	**-0.23**	**3.27**	**-3.69**	**0.54**	**-1.55**	**-2.4E-03**	**-0.01**	**0.40**	**-1.56**
	8.89		33.80	2.75	8.25	-0.24	-0.32	-0.07	-0.53	-0.87	1.49	-0.42	-0.50	0.24	-1.94	3.64	-2.00	0.25	-0.68	-4.21	-1.56	0.59	-1.33
	9.47		6.84	2.70	8.61	-0.29	-0.56	-0.26	-1.26	-0.43	2.98	-2.82	-2.07	0.41	-2.13	3.56	-1.97	0.48	-0.67	-0.31	-3.24	0.90	-1.95
UK	AR(1)	AR(2)	ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.39	**0.20**	**49793.78**	**0.32**	**0.15**	**0.07**	**-0.03**	**1.6E-03**	**-0.09**	**2.2E-03**	**-0.01**	**0.19**	**-0.19**	**-0.11**	**-0.17**	**1.39**	**0.23**	**0.13**	**-3.68**	**0.02**	**0.03**	**0.04**	**0.36**
	4.88	3.00	4.09	3.15	0.90	0.34	-0.11	0.04	-2.93	0.13	-1.35	1.02	-0.41	-3.19	-0.61	1.38	0.21	0.19	-4.23	0.22	0.74	0.14	0.22
	2.20	5.14	8.05	2.66	2.50	0.48	-0.26	0.05	-2.38	0.23	-1.96	0.47	-0.83	-8.74	-1.74	2.28	0.36	0.08	-3.14	0.86	1.56	0.31	0.35
France	AR(1)	AR(2)	ω	α	β	α_{FR}	β_{FR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.60	**0.13**	**5047.30**	**0.14**	**0.74**	**-0.01**	**-0.01**	**6.3E-04**	**-1.8E-03**	**-0.07**	**0.36**	**0.07**	**-0.17**	**3.1E-03**	**-0.01**	**0.23**	**-0.07**	**-0.46**	**0.57**	**-4.4E-03**	**2.9E-03**	**0.14**	**-0.07**
	8.98	1.94	1.64	1.89	6.71	-0.66	-0.85	0.13	-0.78	-1.25	2.16	2.25	-2.52	0.13	-0.06	1.22	-0.26	-1.02	0.86	-0.30	0.42	0.67	-0.17
	2.00	2.89	4.63	3.42	16.52	-1.38	-1.60	0.46	-1.36	-4.53	4.72	3.09	-3.76	0.31	-0.14	1.95	-0.32	-5.13	2.26	-0.41	0.56	1.58	-0.41
Japan	AR(1)	AR(2)	ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.31	**-0.13**	**12341.61**	**0.04**	**0.55**	**-0.06**	**-0.22**	**1.1E-03**	**-0.06**	**0.02**	**-0.01**	**0.03**	**-0.06**	**-2.4E-03**	**-0.03**	**1.06**	**1.61**	**-0.44**	**1.17**	**3.4E-03**	**0.05**	**-0.09**	**0.51**
	5.85	-2.53	2.33	0.63	3.73	-1.34	-2.31	0.04	-1.42	1.04	-0.63	0.31	-0.50	-0.08	-0.51	13.43	1.20	-0.32	0.52	0.11	2.10	-0.15	0.44
	7.02	-3.26	4.07	1.16	7.00	-2.84	-6.27	0.08	-2.79	5.70	-2.31	0.46	-0.51	-0.10	-0.70	2.89	3.11	-1.55	1.12	0.28	2.61	-0.56	1.03
Switzerland	AR(1)		ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.42		**8424.01**	**0.17**	**0.46**	**-0.02**	**0.11**	**0.01**	**-0.03**	**4.4E-03**	**-2.4E-03**	**0.01**	**-0.05**	**-0.01**	**0.07**	**-0.08**	**0.32**	**0.13**	**-0.58**	**-0.01**	**-3.8E-03**	**-0.11**	**-0.18**
	4.59		1.30	1.43	1.68	-0.34	1.28	0.48	-1.69	0.74	-1.12	0.43	-1.00	-0.33	0.58	-0.27	0.71	0.18	-0.74	-0.39	-0.43	-0.39	-0.24
	7.78		3.21	2.33	4.08	-1.50	2.34	0.92	-3.29	1.87	-2.21	1.17	-2.70	-1.07	1.13	-0.69	1.32	0.46	-1.84	-2.28	-1.30	-1.70	-0.85
Netherlands	AR(1)	AR(2)	ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.59	**0.28**	**907.94**	**0.35**	**0.22**	**0.01**	**-0.01**	**-1.4E-03**	**3.3E-03**	**-1.2E-04**	**-1.5E-04**	**-1.8E-03**	**4.4E-03**	**-1.0E-04**	**-1.8E-03**	**-2.9E-04**	**-1.4E-02**	**1.8E-03**	**2.8E-02**	**-5.0E-05**	**1.3E-03**	**0.02**	**0.08**
	9.61	4.67	2.52	3.08	1.34	1.62	-1.61	-1.47	1.20	-0.42	-0.98	-0.34	0.36	-0.08	-0.86	-0.17	-1.94	0.17	0.64	-0.05	1.32	0.52	1.11
	3.54	6.61	9.65	4.47	3.82	3.52	-6.78	-4.37	2.87	-2.94	-2.88	-1.47	1.72	-0.25	-5.24	-0.47	-16.79	0.41	2.79	-0.39	2.73	1.62	2.16
Austria	AR(1)	AR(2)	ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{DT}	β_{DT}	α_{RS}	β_{RS}	α_{SP}	β_{SP}
	0.42	**0.20**	**3141.83**	**0.17**	**0.59**	**-4.7E-05**	**3.1E-03**	**0.01**	**-0.01**	**1.4E-03**	**-8.4E-04**	**1.2E-03**	**-3.3E-03**	**-2.2E-03**	**-1.8E-03**	**5.3E-05**	**-0.02**	**-0.07**	**0.05**	**-4.5E-04**	**-2.8E-06**	**-0.02**	**-0.07**
	5.57	2.70	2.52	2.09	3.49	0.00	0.18	1.32	-1.75	0.73	-1.14	0.07	-0.14	-0.48	-0.23	0.01	-0.92	-0.70	0.24	-0.12	0.00	-0.41	-0.53
	8.77	4.80	4.41	2.47	6.65	-0.01	0.44	1.83	-2.97	2.62	-3.10	0.10	-0.14	-1.30	-0.80	0.02	-1.55	-1.62	0.43	-0.33	0.00	-0.83	-0.87
Spain	AR(1)		ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	α_{RS}	β_{RS}
	0.62		**1440.84**	**0.09**	**0.61**	**-3.9E-03**	**7.4E-04**	**4.2E-04**	**-3.8E-03**	**4.3E-04**	**1.7E-04**	**-3.1E-05**	**-0.02**	**5.1E-04**	**9.0E-04**	**-2.1E-03**	**3.1E-03**	**-0.02**	**-0.04**	**0.38**	**-0.31**	**-8.9E-04**	**-5.1E-04**
	8.86		2.53	1.36	4.26	-1.05	0.14	0.24	-1.54	0.69	0.64	0.00	-1.23	0.30	0.26	-1.06	0.30	-0.70	-1.03	3.44	-1.73	-0.52	-0.56
	2.03		3.67	2.44	6.04	-1.19	0.21	1.32	-4.43	2.10	1.75	-0.01	-2.15	0.52	0.63	-2.61	0.92	-1.27	-1.88	1.71	-1.52	-1.34	-1.29
Russia	AR(1)		ω	α	β	α_{FR}	β_{FR}	α_{GR}	β_{GR}	α_{IT}	β_{IT}	α_{SW}	β_{SW}	α_{UK}	β_{UK}	α_{JP}	β_{JP}	α_{AS}	β_{AS}	α_{DT}	β_{DT}	αSP	βSP
	0.34		**2558.00**	**0.14**	**0.64**	**0.12**	**-0.03**	**0.02**	**-0.02**	**2.9E-03**	**-6.3E-04**	**-0.01**	**0.13**	**3.5E-03**	**-0.03**	**0.04**	**-0.01**	**-0.18**	**0.26**	**-0.27**	**0.69**	**-0.11**	**0.10**
	3.60		0.78	1.65	5.95	3.47	-0.37	1.45	-1.00	1.27	-0.28	-0.18	0.93	0.21	-0.88	1.63	-0.15	-4.53	0.85	-0.78	0.79	-0.57	0.25
	5.52		1.10	2.55	5.90	1.15	-0.77	1.46	-1.69	0.17	-0.09	-0.26	1.09	0.36	-1.64	1.64	-0.19	-1.76	1.16	-2.03	1.97	-1.39	0.46

Note: The three entries corresponding to each parameter are their estimates (in bold), their asymptotic t-ratios, and the Bollerslev and Wooldridge (1992) robust t-ratios, respectively.

Figure 1: Weekly Tourist Arrivals for the Ten Main Tourist Source Countries for the Maldives

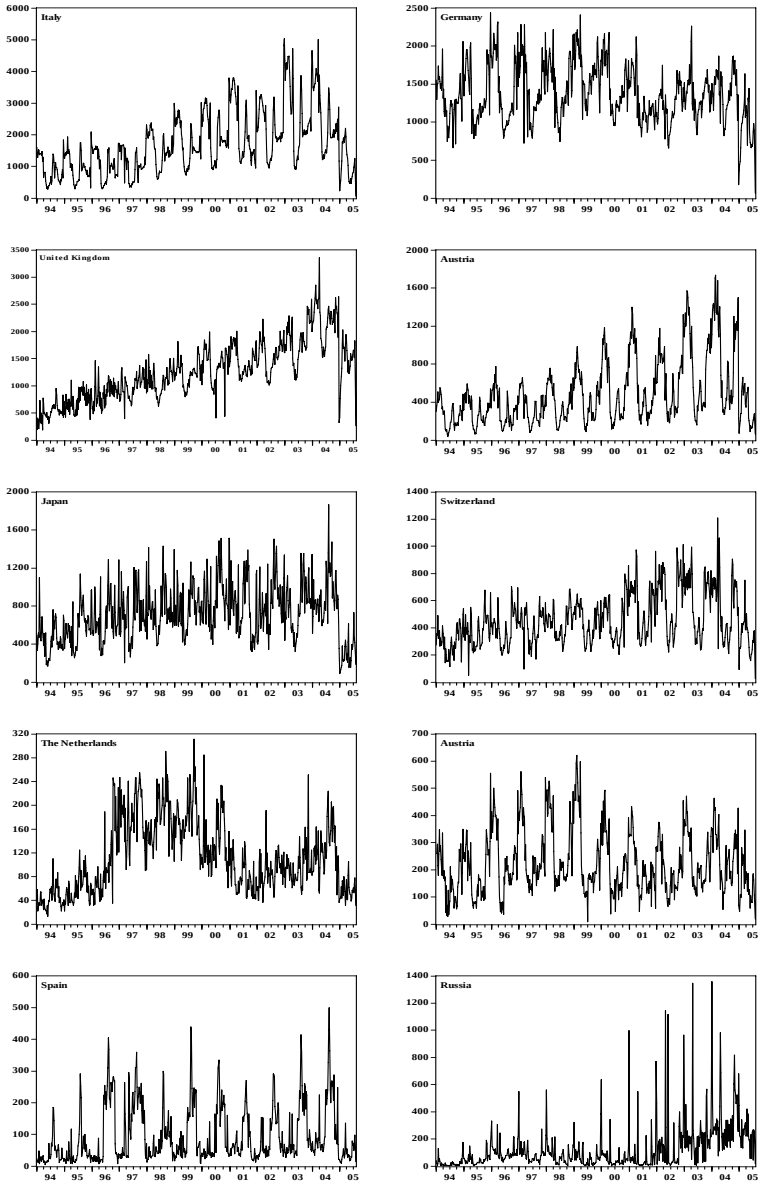

Table 2: Conditional Correlations fo Ten Main Tourist Source Countries for the Maldives

Source	Italy	Germany	UK	France	Japan	Switzerland	Netherlands	Austria	Spain	Russia
Italy	1	0.11	0.28	0.43	0.21	0.31	0.06	0.22	0.19	0.06
Germany		1	0.32	0.16	0.07	0.30	0.13	0.45	0.12	0.02
UK			1	0.32	0.12	0.31	0.10	0.34	0.18	-0.04
France				1	0.13	0.31	0.01	0.25	0.14	0.03
Japan					1	-0.02	0.17	0.18	0.12	0.05
Switzerland						1	0.04	0.27	0.01	-0.09
Netherlands							1	0.13	0.06	0.03
Austria								1	0.20	0.07
Spain									1	0.04
Russia										1