Modelling Volatility Spillovers And Causality In International Tourism And Country Risk For Cyprus And Malta

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EXTENDED ABSTRACT

Small Island Tourism Economies (SITEs) are developing sovereign countries that rely on tourism as a source of exports, and need a consistent inflow of foreign investment in order to facilitate economic growth. Access to international capital markets helps SITEs smooth out their consumption over time, while absorbing adverse domestic production shocks. However, SITEs are perceived to suffer from frequent natural disasters, are susceptible to adverse macroeconomic shocks, and are considered to have high risk. The main impediments to lend to SITEs are the costs of obtaining information and country risk. This paper provides a comparison of tourism growth, country risk returns and their associated volatilities (or uncertainty) for 2 SITEs, namely Cyprus and Malta. Monthly data are available for both international tourist arrivals and composite country risk ratings compiled by the International Country Risk Guide (ICRG) for the period May 1986 to May 2002. The time-varying conditional variances of tourism growth and country risk returns for the 2 SITEs are analysed using multivariate models of conditional volatility. These models are able to capture the dynamics in the conditional variance, and hence risk, as well as the existence of risk spillovers between tourism growth and country risk returns for Cyprus and Malta.

During the last two decades, there has been a growing fascination with the livelihood of islands with small populations and territories, which overwhelmingly rely on tourism as a source of exports. There are numerous small island territories worldwide, such as Aruba, Tahiti, New Caledonia, Canary Islands and the Balearic Islands. However, this paper focuses only on sovereign island countries, which are members of the United Nations Organization. Unlike small island territories, sovereign island countries are economically, financially and politically independent of any other country. Shareef and Hoti (2005) identify 20 SITEs as developing island countries with populations of less than 1 million. Tourism forms the economic foundation of SITEs, with tourism earnings accounting for a significant proportion of the value added in the national product. The fundamental aim of tourism development in SITEs is to increase foreign exchange earnings in order to finance imports. These countries rely heavily on service industries, with tourism accounting for more than 20% of export earnings. A large proportion of tourism income is used to finance imports to sustain the tourism industry. Labour is also imported in tourism, which results in substantial foreign exchange outflows (for further details, see Shareef and McAleer (2004) and Shareef and Hoti (2005)).

The main purpose of this paper is to assess the fluctuations and volatility in tourism growth and country risk returns for Cyprus and Malta, the only two SITEs for which both international tourist arrivals and country risk ratings are available on a monthly basis. Since these economies depend primarily on tourism earnings as a source of foreign exchange and employment, a careful examination of the volatility of tourist arrivals is important to formulate macroeconomic policy, as well as decision-making in the public and private sectors.

As a result of time-varying effects, such as natural disasters, ethnic conflicts, crime, and threats of global terrorism, there have been dramatic changes in the arrivals of international tourists to SITEs. The only cases where variations in international tourism demand have been investigated in the tourism literature are given in Chan et al. (2004), Chan et al. (2005), Shareef and McAleer (2004), and Hoti, León and McAleer (2005). A common feature of SITEs is that they depend heavily on foreign aid to finance development. However, SITEs have limited access to commercial borrowings because they are considered to be high risk. Even with relatively low levels of indebtedness, SITEs generally face difficulties in borrowing on commercial terms. The costs of obtaining information on the economy and high country risk issues are major impediments to borrowing. Consequently, it is essential to analyse the risk ratings and risk returns of SITEs.

The plan of the paper is as follows. Section 1 discusses the tourism industries of Cyprus and Malta. Some aspects of country risk are presented in Section 2. The model is discussed in Section 3, while the data are described in Section 4. The multivariate empirical results in Section 5 analyse the tourism growth and risk returns series, and risk spillovers between tourism growth and country risk returns for Cyprus and Malta.

1. INTRODUCTION

One purposes of this paper is to assess the fluctuations and volatility in tourism growth for Cyprus and Malta, the only two SITEs for which both international tourist arrivals and country risk ratings are available on a monthly basis.

1.1 Tourism Industry of Cyprus

Cyprus is a very popular holiday resort, with the tourist industry accounting for about 10% of the GDP, 40% of export earnings and 12% of the total working population. Employment in the tourism sector doubled during the period 1985-1998 and remained stable in subsequent years. European tourists dominate tourism in Cyprus. The surpluses in the national travel account tripled over the period 1985-1998. Furthermore, the importance of the tourism industry is reflected in the significant share of the international tourism receipts, which accounts for more than 50% of total services receipts. Growth in international tourist arrivals was hampered by the 1991 Gulf War, but recovered to pre-war levels in subsequent years. Development of tourist infrastructure is the key to tourism growth. Bed capacity has increased by 56% during the period 1990-1998, reaching 87,000 beds. Considerable investment was also made in upgrading most of the 3-star facilities to 5-star during 1990-1998, while non-starred hotels have declined considerably.

During 1985-1998, the highest number of international tourist arrivals was from UK, accounting for 50%, followed by Germany at 10%, and Sweden and Greece accounting for 4% and 3%, respectively. More than 17% of total tourist arrivals are from other EU countries, while the largest emerging tourist source market is Russia, accounting for 9%. Tourists from Asian countries accounted for over one-fifth in 1985, but in 1998 they accounted for only 5%. Overall, the length of stay has declined since 1990 from 13 days to 11 days in 2000. Cyprus has the capability to pursue a strategy of value and should pursue the objective of increasing tourism revenue through increased visitor expenditure, increased length of stay and repeaters, and lengthening the tourism season.

1.2 Tourism Industry of Malta

Tourism is an important sector for the Maltese economy, contributing around 30% of GDP and 25% of export earnings. Malta is essentially a holiday destination, with small proportions of business and health tourists.

The tourism industry has changed dramatically since the 1960s. During the period 1990-1998, employment in the tourism sector increased by 6.6% per annum. Furthermore, employment in the ancillary services industries such as the national airline, care hire, and catering, has also been increasing.

Due to the increase in international tourist arrivals, there have been developments in the tourist infrastructure. Due to the increased popularity, self-catering tourism accommodation constitutes the largest proportion of bed capacity. Efforts have also been made to improve the quality of accommodation. The number of 5-star quality hotel accommodation increased by 67% over 1985-2000, while various types of holiday complexes have increased by more than 50% over the same period. Furthermore, investments have been also directed towards the increasing capacity in the catering sector, which has resulted in doubling the number of restaurants and their seating capacity.

The majority of international tourists to Malta come from the European Union, mainly from the UK, given the historical ties. Intensive advertising campaigns to reduce the dependency on British tourists have broadened the tourism source base, which now includes tourists from Central and Northern Europe. There is strong seasonality in international tourism to Malta, during the spring and summer months. Attempts have been made to correct the uneven seasonality through promotional efforts, such as intensive advertising and cheaper accommodation rates in the off-season months. However, the seasonal pattern in international tourism remains strong. The events of 11 September had an adverse impact on international tourist arrivals to Malta, which led to an economic recession. However, the economy recovered in 2002, as tourist arrivals returned to its pre-September 11 levels.

2. COUNTRY RISK RATINGS

A common feature of SITEs is that they depend heavily on foreign aid to finance development. Aid flows dropped sharply during the last decade of the 20th Century, due to the collapse of communism in Europe. Moreover, SITEs have limited access to commercial borrowings because they are considered to be high risk (Commonwealth Secretariat/World Bank (2000)). Consequently, it is essential to analyse the risk ratings of SITEs.

Even with relatively low levels of indebtedness, SITEs generally face difficulties in obtaining capital from international financial markets. According to the Commonwealth Secretariat/World Bank (2000) study, this is because obtaining reliable internal information on SITEs is difficult. Country risk ratings issued by rating agencies for some SITEs are relatively low, indicating high level of associated risk. Moreover, the weak legal system in SITEs is a predicament in attracting foreign investors. As a result, the cost of borrowing becomes relatively high, so that SITEs have to make a considerable effort to integrate into the international financial system.

A primary function of country risk assessment is to anticipate payment problems by sovereign borrowers.

There are three main components of country risk, namely economic, financial and political risk. Country risk assessment evaluates economic, financial, and political factors, and their interactions in determining the risk associated with a country. As stated in Brewer and Rivoli (1990), perceptions of the determinants of country risk are important as they affect the supply and cost of international capital flows. However, to date there has been limited discussion of country risk in SITEs. The concept of country risk in SITEs has been analysed only recently in Hoti, McAleer and Shareef (2005), and Shareef and Hoti (2005).

The importance of country risk analysis is underscored by the existence of several prominent country risk rating agencies, such as Moody's, Standard and Poor's, Fitch IBCA, Euromoney, Institutional Investor, Economist Intelligence Unit, International Country Risk Guide, and Political Risk Services (for a critical survey of the country risk rating systems, see Hoti and McAleer (2004, 2005)). Country risk ratings are crucial for countries seeking foreign investment and selling government bonds on the international financial market, and for business decisions by large corporations and international financial institutions. These agencies provide qualitative and quantitative country risk ratings, combining information about arbitrary measures of economic, financial and political risk to obtain a composite risk rating.

International Country Risk Guide (ICRG) has compiled economic, financial, political and composite risk ratings for 93 countries on a monthly basis since January 1984. As of May 2005, the four risk ratings were available for a total of 140 countries. The ICRG rating system comprises 22 variables representing three major components of country risk, namely economic, financial and political. Using each set of variables, a separate risk rating is created for the three components, on a scale of 0-100. The three component risk ratings are then combined to derive a composite risk rating, as an overall measure of country risk. Each of the five economic and financial components account for 25%, while the twelve political component accounts for 50% of the composite risk rating. The lower (higher) is a given risk rating, the higher (lower) is the associated risk. In essence, the country risk rating is a measure of country creditworthiness.

Although the ICRG rating system does not include a specific measure of tourism earnings for countries, the importance of tourism earnings and tourism growth can still be traced through the ICRG economic and financial risk components. As tourism is a service export, tourism earnings are accommodated in current account balance, one of the 22 variables in the ICRG rating system. In SITEs, such as the Maldives, the development of tourism infrastructure, namely airports to accommodate wide-bodied aircrafts, is facilitated through capital raised in international financial markets. Moreover, foreign debt obligations are predominantly serviced by tourism earnings. Any unfavourable shocks to tourism earnings, such the 2004 Boxing Day Tsunami, lead to considerable difficulty in servicing the debt. Hence, there is a direct relationship between debt servicing and earnings from tourism. This paper analyses composite risk ratings, as overall measures of country risk for Cyprus and Malta, the two representative SITEs situated in the Mediterranean.

3. MULTIVARIATE MODELS OF CONDITIONAL VOLATILITY

Conditional volatility (or uncertainty) models have been widely used in economics and finance to evaluate risk, asymmetric shocks and leverage effects (namely, the effects of positive and negative shocks on risk). The primary empirical purpose of the paper is to model the monthly international tourism growth rates, country risk returns and their associated volatility for Cyprus and Malta for the period May 1986 to May 2002. The international tourism growth rate is defined as the monthly percentage change in international tourist arrivals, while country risk returns are defined as the monthly percentage change in country risk ratings. Volatility (or uncertainty) refers to the changes in the variability of shocks to tourism growth rates and country risk returns over time, and is defined as the squared deviation of each observation from the respective sample mean.

As a result of many factors that can affect the world tourism market and country risk, it is clear that shocks to tourism growth rate and country risk returns may not have the same variability over time. In the case of tourism, uncertainty may be present due to various unexpected factors which can affect consumer decisions, such as changes in disposable income and wealth, advertising campaigns, and random events, such as 11 September 2001, SARS, Bali bombing 2002, and the 2004 Boxing Day Tsunami. Moreover, the uncertainty could also vary across different destinations and sources. With respect to country risk, uncertainty may arise due unexpected domestic and foreign economic, financial and political factors.

Variations in the degree of uncertainty across tourism growth and country risk returns need to be appreciated for an optimal economic management and marketing decisions regarding tourism growth and country risk. In addition, models of uncertainty permit a distinction to be made between the short and long run persistence of shocks to tourism growth and country risk returns, which provide useful information regarding the shock effects on uncertainty.

The analysis in this paper is based on Engle's (1982) development of time-varying volatility (or uncertainty) using the autoregressive conditional heteroscedasticity (ARCH) model, and subsequent developments associated with the ARCH family of models (see, for example, the recent survey by Li, Ling and McAleer

(2002)). Several theoretical developments have been suggested by Wong and Li (1997), Hoti, Chan and McAleer (2002), and Ling and McAleer (2002a, 2002b, 2003). A detailed comparison of the structural and statistical properties of alternative univariate and multivariate, conditional and stochastic, volatility models is given in McAleer (2005).

Two rather general constant conditional correlation models are the VARMA-GARCH model of Ling and McAleer (2003) and the VARMA-AGARCH model of Hoti, Chan and McAleer (2002). These models, which permit an analysis of risk spillovers between international tourism and country risk across countries, are estimated using monthly data on tourism growth and country risk returns for Cyprus and Malta.

Consider the following specification for tourism growth or risk return for a country (as measured in log-differences), 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 tourism growth and country risk returns for Cyprus and Malta; $\eta_t = (\eta_{1t},...,\eta_{mt})'$ is a sequence of independently and identically distributed (*iid*) random vectors that is obtained from standardising the shocks to tourism growth and risk returns, ε_t, using $D_t = diag(h_{1t}^{1/2},...,h_{mt}^{1/2})$, 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; $m\,(=4)$ is the number of monthly data series, namely tourism growth rates and country risk returns for Cyprus and Malta, respectively; and $t = 1,...,193$ monthly observations for the period May 1986 to May 2002.

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,

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

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 tourism growth and risk return 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 four data series. Moreover, CCC does not accommodate the (possibly) asymmetric effects of positive and negative shocks on the conditional volatility of tourism growth and risk returns for a country. It is important to note that Γ is the matrix of constant conditional correlations of standardized shocks to tourism growth and risk return, with the typical element 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 tourism growth or risk return for a country 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 tourism growth or risk returns, is given by

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

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

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

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 $H_t = \left(h_{1t},...,h_{mt}\right)'$. As an extension of (3) to incorporate the effects of shocks across tourism growth and risk returns, and hence spillover effects in uncertainty across the four 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 VARMA-AGARCH, model of Hoti, Chan and McAleer (2002) is defined as follows:

$$\Phi(L)(Y_t - \mu) = \Psi(L)\varepsilon_t \tag{4}$$

$$\begin{aligned} \varepsilon_t &= D_t \eta_t \\ H_t &= W + \left(\sum_{l=1}^{r} A_l + \sum_{l=1}^{r} C_l I(\eta_{t-1}) \right) \vec{\varepsilon}_t + \sum_{l=1}^{p} B_l H_{t-l} \end{aligned} \tag{5}$$

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 $l = 1,...,r$.

4. DATA DESCRIPTION

In this paper, we estimate the alternative multivariate conditional volatility models using monthly data on tourism growth and country risk returns for Cyprus and Malta. These are the only two SITEs for which monthly data are available for both international tourist arrivals and composite country risk ratings compiled by the International Country Risk Guide (ICRG) for the period May 1986 to May 2002. Monthly international tourist arrivals data are obtained from the Statistical Service of Cyprus and National Statistics Office of Malta. In the case of Cyprus, monthly tourist arrivals data were not available for 1995 and therefore, the mean for 1993, 1994, 1996 and 1997 were used in calculating the trends and volatilities.

This paper focuses on the rate of change of international tourist arrivals (or tourism growth) and the rate of change of country risk ratings (or risk returns) to avoid any problems of non-stationarity (or explosive series). Moreover, as country risk ratings can be treated as financial indexes, their rate of change merits the same attention as their financial counterparts. Similar seasonality patterns are observed for the two tourism growth series, while country risk returns for the two SITEs differ substantially. There is a noticeable clustering of risk returns for Cyprus, but not for Malta. Overall, there is strong evidence of volatility clustering, with the presence of some outliers and/or extreme observations. Malta seems to be more volatile in tourism growth, while Cyprus seems to be more volatile in country risk returns.

5. EMPIRICAL RESULTS

Using the data on the four monthly data series, namely tourism growth rates and risk returns for Cyprus and Malta, the conditional mean is modelled in each case as an AR(1) process. In addition to estimating the conditional mean for each data series, the VARMA-GARCH and VARMA-AGARCH models are used to estimate the conditional volatility associated with tourism growth and country risk returns series. On the basis of the standardised shocks, the two multivariate models are used to estimate the conditional correlation coefficients of the monthly shocks between tourism growth and country risk return series. This can provide useful information regarding the relationship between Cyprus and Malta in terms of the shocks to tourism growth and/or country risk returns.

In this paper, the estimates of the parameters are obtained using the Berndt, Hall, Hall and Hausman (BHHH) (1974) in the EViews 4 econometric software package. In order to check for the consistency of the empirical results, the RATS 6 econometric software package was also used. The two packages yielded virtually identical results. Tables 1-4 report the VARMA-GARCH and VARMA-AGARCH estimates. Both the asymptotic and the Bollerslev-Wooldridge (1992) robust t-ratios are reported in order to accommodate possible extreme values in the data.

Tables 1-2 report the estimates of VARMA-GARCH for tourism growth and country risk returns for both Cyprus and Malta. The conditional mean estimates show significant dynamics for all four data sets. Based on the conditional variance estimates in Table 1, tourism growth for Cyprus is affected by its own previous short run and long run shocks, and by previous long run shocks in risk returns for Cyprus and tourism growth for Malta. The country risk return for Cyprus is affected by its own previous long run shocks, as well as by previous short and/or long run shocks in tourism growth for both Cyprus and Malta, and the risk return for Malta. As given in Table 2, tourism growth for Malta is affected only by previous short and/or long run shocks in risk returns for both Malta and Cyprus, and tourism growth for Cyprus. Therefore, only volatility spillover effects are observed for tourism growth in Malta, with no own effects. However, the country risk return for Malta is affected by its own previous long run shock, and by previous short and long run shocks in the risk return for Cyprus.

Estimates of VARMA-AGARCH are presented in Tables 3-4. As in the previous two tables, significant dynamics are observed for all four data series. The estimates of the conditional variance show significant asymmetric effects of positive and negative shocks on the conditional volatility in tourism growth for both Cyprus and Malta, so that VARMA-AGARCH is preferred only in these two cases. Given the insignificant asymmetric effects of shocks to country risk returns for Cyprus and Malta, VARMA-GARCH is preferred to its VARMA-AGARCH counterpart.

In terms of the multivariate spillover effects on the conditional variance given in Table 4, tourism growth for Cyprus is affected only by its previous short and long run shocks, while tourism growth for Malta is affected by its own previous short and long run shocks, and previous long run shocks in tourism growth and country risk return for Cyprus. Unlike the case of VARMA-GARCH, volatility spillover effects are observed only from tourism growth and risk returns for Cyprus to tourism growth for Malta.

Using the estimated standardised shocks to tourism growth and risk returns for Cyprus and Malta obtained from the VARMA-GARCH and VARMA-AGARCH models, the conditional correlations for the four data series are calculated and reported in Table 5. It is clear that the conditional correlations between the four data series are all positive and similar for the two models. For both models, of the 6 possible pairs of conditional correlations, the two highest conditional correlations hold between the standardized shocks to tourism growth rates for the two countries (0.778 for VARMA-GARCH and 0.781 for VARMA-AGARCH), followed by their country risk returns (0.433 for VARMA-GARCH and 0.380 for VARMA-AGARCH). For both countries, the shocks to tourism growth rates and the shocks to country risk returns seem to be independent of each other. Moreover, the shocks to tourism growth rates for Cyprus (Malta) also seem to be independent of the shocks to country risk returns for Malta (Cyprus). These empirical results suggest that Cyprus and Malta are closely related only in terms of the shocks to their tourism growth rates, and to a lesser extent the shocks to their country risk returns. Such issues based on models of uncertainty have not been considered previously in the tourism growth and country risk literature.

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Table 1: VARMA-GARCH Spillover Effects for Cyprus

Data	Conditional Mean		Conditional Variance								
			Own Effects			Spillover Effects					
TG	θ_1	θ_2	ω_{TG_C}	α_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}	α_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}
	0.012	0.475	-0.166	-0.060	0.881	4.053	173.036	0.145	2.789	-6.658	-1.102
	0.433	5.902	-17.795	-1.437	8.375	0.171	1.846	1.900	22.389	-0.682	-0.043
	0.534	9.351	-2.430	-2.143	15.021	0.207	3.079	1.150	2.572	-0.683	-0.048

Data	Conditional Mean		Conditional Variance								
			Own Effects			Spillover Effects					
CRR	θ_1	θ_2	ω_{CRR_C}	α_{CRR_C}	β_{CRR_C}	α_{TG_C}	β_{TG_C}	α_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}
	0.002	-0.182	3.E-04	-0.084	0.886	-1E-04	-4E-04	-2E-05	-0.004	0.037	0.128
	1.272	-1.678	27.184	-2.142	8.610	-1.020	-0.747	-0.052	-3.953	1.412	1.513
	2.952	-2.735	81.851	-1.340	5.981	-1.999	-1.060	-0.097	-5.763	2.287	2.937

Table 2: VARMA-GARCH Spillover Effects for Malta

Data	Conditional Mean		Conditional Variance								
			Own Effects			Spillover Effects					
TG	θ_1	θ_2	ω_{TG_M}	α_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}	α_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}
	0.010	0.447	0.060	-0.075	0.112	11.809	20.668	-0.072	-0.136	-24.591	190.480
	0.530	7.157	1.533	-0.760	0.149	0.656	0.218	-2.173	-1.027	-1.851	0.728
	0.684	11.843	1.933	-1.451	0.541	2.216	1.294	-3.547	-0.451	-6.210	2.035

Data	Conditional Mean		Conditional Variance								
			Own Effects			Spillover Effects					
CRR	θ_1	θ_2	ω_{CRR_M}	α_{CRR_M}	β_{CRR_M}	α_{TG_M}	β_{TG_M}	α_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}
	0.001	-0.381	2E-05	0.020	0.803	-3E-04	-0.001	2E-04	3E-05	-0.068	0.486
	0.876	-4.194	0.222	1.011	12.422	-1.348	-0.332	1.787	-1.248	-2.268	2.993
	1.556	-2.324	0.215	0.413	3.193	-0.678	-0.420	1.080	-0.089	-2.324	1.876

Table 3: VARMA-AGARCH Spillover Effects for Cyprus

Data	Conditional Mean		Conditional Variance									
			Own Effects				Spillover Effects					
TG	θ_1	θ_2	ω_{TG_C}	α_{TG_C}	γ_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}	α_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}
	-0.018	0.511	0.028	-0.123	0.287	0.867	1.465	83.350	-0.203	-0.142	-6.600	-8.014
	-0.541	5.314	0.200	-1.729	1.814	8.082	0.055	1.044	-0.868	-0.065	-0.521	-0.231
	-0.796	8.658	0.542	-2.867	2.251	13.447	0.076	1.496	-1.288	-0.173	-0.674	-0.260

Data	Conditional Mean		Conditional Variance									
			Own Effects				Spillover Effects					
CRR	θ_1	θ_2	ω_{CRR_C}	α_{CRR_C}	γ_{CRR_C}	β_{CRR_C}	α_{TG_C}	β_{TG_C}	α_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}
	0.002	-0.160	3E-04	-0.095	0.025	0.882	-1E-04	-5E-04	-5E-06	-0.004	0.038	0.129
	1.272	-1.321	20.460	-2.217	0.450	9.053	-1.072	-0.845	-0.017	-3.094	1.557	1.494
	2.746	-2.529	95.503	-1.514	0.852	6.170	-2.157	-1.026	-0.033	-4.967	2.322	2.987

Table 4: VARMA-AGARCH Spillover Effects for Malta

Data	Conditional Mean		Conditional Variance									
			Own Effects				Spillover Effects					
TG	θ_1	θ_2	ω_{TG_M}	α_{TG_M}	γ_{TG_M}	β_{TG_M}	α_{CRR_M}	β_{CRR_M}	α_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}
	-0.009	0.433	0.005	-0.321	0.360	1.012	-2.369	-5.885	-0.002	0.020	1.395	25.904
	-0.503	6.077	0.728	-3.149	2.433	20.365	-1.212	-0.855	-0.138	0.362	15.120	1.277
	-0.698	10.117	88.799	-4.906	4.992	17.805	-1.145	-1.413	-0.311	2.212	0.293	2.544

Data	Conditional Mean		Conditional Variance									
			Own Effects				Spillover Effects					
CRR	θ_1	θ_2	ω_{CRR_M}	α_{CRR_M}	γ_{CRR_M}	β_{CRR_M}	α_{TG_M}	β_{TG_M}	α_{TG_C}	β_{TG_C}	α_{CRR_C}	β_{CRR_C}
	0.001	-0.246	2E-05	-0.003	-0.013	0.964	-1E-04	-0.001	9E-05	8E-05	-0.051	0.171
	1.459	-8.004	8.044	-0.960	-2.067	46.858	-3.050	-19.746	4.781	2.190	-9.040	4.184
	2.530	-2.295	33.796	-0.246	-0.584	13.975	-4.693	-29.335	4.113	13.977	-2.645	13.073

Notes: The three entries corresponding to each parameter are their estimates, their asymptotic t-ratios, and the Bollerslev and Wooldridge (1992) robust t-ratios. TG, CRR, C and M refer to tourism growth, country risk returns, Cyprus and Malta, respectively.

Table 5: Conditional Correlations

VARMA-GARCH	Cyprus_TG	Cyprus_CRR	Malta_TG	Malta_CRR
Cyprus_TG	1.000	0.043	0.778	0.042
Cyprus_CRR		1.000	0.138	0.433
Malta_TG			1.000	0.067
Malta_CRR				1.000

VARMA-AGARCH	Cyprus_TG	Cyprus_CRR	Malta_TG	Malta_CRR
Cyprus_TG	1.000	0.053	0.781	0.111
Cyprus_CRR		1.000	0.137	0.380
Malta_TG			1.000	0.136
Malta_CRR				1.000

Note: TG, CRR, C and M refer to tourism growth, country risk returns, Cyprus and Malta, respectively.