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MODELLING MULTIVARIATE VOLATILITY IN INTERNATIONAL TOURISM AND COUNTRY RISK FOR CYPRUS AND MALTA

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ABSTRACT

Small Island Tourism Economies (SITEs) are developing 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 small island economies are considered to be 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 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 the existence of risk spillovers between tourism growth and country risk returns for Cyprus and Malta.

1. INTRODUCTION

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. 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 is to increase foreign exchange earnings in order to finance imports. These SITEs rely heavily on service industries, with tourism accounting for the highest proportion of export earnings. A large proportion of tourism income is used to finance imports to sustain the tourism industry. Labour is also imported for employment in tourism, which results in substantial foreign exchange outflows (for further details see Shareef and McAleer (2004)).

Multilateral agencies and academic institutions have produced a variety of island-related research programmes, which have addressed the special problems and opportunities associated with these small island economies in a period of vast globalisation. However, there is only a limited literature on the significance of tourism in SITEs and their economic implications. Although international tourism is presently the fastest growing and most important tradeable sector in the world economy, this important sector has often been neglected and the exisitng literature is limited. Consequently, little is known about the relationship between tourism development and economic performance, particularly with respect to SITEs. The fundamental aim of this paper is to assess the fluctuations and volatility in tourist arrivals to two representative SITEs, namely Cyprus and Malta. Since SITEs 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, among others, there have been dramatic changes in the arrivals of international tourists to SITEs. The only cases where variations in international tourism demand, particularly the conditional variance in international tourist arrivals, have been investigated in tourism literature are 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.

Country risk refers broadly to the likelihood that a sovereign state or borrower from a particular country fail to meet their obligations towards foreign lenders and/or investors. Owing to the increased uncertainty arising from events in the last two decades, the associated risks have become more difficult to analyse and predict for decision makers in the economic, financial and political sectors (for further details see Hoti and McAleer (2004, 2005)). A primary function of country risk assessment is to anticipate payment problems by sovereign borrowers. Country risk assessment evaluates economic, financial, and political factors, and their interactions in determining the risk associated with a particular country. As argued in Brewer and Rivoli (1990), perceptions of the determinants of country risk are important because they affect both the supply and cost of international capital flows.

The plan of the paper is as follows. Section 2 discusses the tourism industries of Cyprus and Malta. Some aspects of country risk, with particular emphasis on the ICRG rating system regarding country risk ratings, are presented in Section 3. The Hoti, Chan and McAleer (2002) asymmetric VARMA-GARCH model is discussed in Section 4, while the data are described in Section 5. The multivariate empirical results in Section 6 analyse the multivariate tourism growth and risk returns series, and risk spillovers between tourism growth and country risk returns for Cyprus and Malta. Some concluding remarks are given in Section 7.

2. TOURISM INDUSTRY FOR THE 2 SITES

Small island tourism economies have delicate ecosystems, and are consistently threatened by natural disasters and the effects of environmental damage. Careful planning is required to maintain sustainability of tourism and to limit its environmental damage. Although tourism has contributed significantly to economic development in many SITEs, they need to be managed responsibly to secure long-term sustainability.

2.1 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. Cyprus comprises six different regions, namely Lefkosia, Lemesos, Larnaka, Ammochostos, Pafos and Hill Resorts. Ammochostos has the highest of bed capacity of 40%, followed by Pafos, 24%, Lemesos, 20%, and Larnaca, 11%. Lefoskia attracts more business tourists and accounts for only 3% of the total accommodation capacity.

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. According to European Commission (2001), tourism will continue to be the leading sector of the Cypriot economy. 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.

2.2 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. While in 1960 there were only 26 hotels with 1,388 beds, today there are over 250 hotels with over 40,000 beds. Evaluations by the European Commission (2001) show that for every Maltese Lira of tourist expenditure on the island, there has been an average multiplier effect of 1.14% of GDP. Tourism growth has also contributed to increasing employment. 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 by increasing the choice of accommodation facilities through investment in theme hotels and self-catering establishments. 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 accommodation increased by 67% over the period 1985 to 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.

Some interesting features of tourism to Malta are worth noting. These include the increase in the average duration of stay from 7 days in 1985 to 11 days in 2001. Although the duration of stay has changed from year to year, tourism earnings have increased steadily during the same period due to investments in the Maltese tourism infrastructure. The increasing number of international tourist arrivals offsets any adverse movements in capacity utilisation through earnings. Capacity utilisation rates increased over the period 1985 to 2000. In 1985, the average capacity utilisation rate was more than 50% and reached 60% in 2001, given the events of September 11.

The majority of international tourists to Malta come from the European Union (EU), mainly from the UK, given the historical ties. In the 1960s, British tourists accounted for nearly 70% of the total tourist arrivals, while today they account for 40%. 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, mainly 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 strong seasonal pattern in international tourism remains strong.

The events of 11 September 2001 had an adverse impact on international tourist arrivals to Malta, which led to an economic recession. However, the economy recovered in 2002, as tourism industry returned to its pre-September 11 levels.

3. 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. Consequently, it is essential to analyse the risk ratings and risk returns of SITEs.

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. Difficulties in prosecuting illegal activities in SITEs make contract enforcement costly for investors, contribute to the high costs of borrowing for SITEs, and prevent a smooth integration of SITEs into international financial capital markets.

Country risk refers broadly to the likelihood that a sovereign state or borrower from a particular country fail to meet their obligations towards foreign lenders and/or investors. The Third World debt crisis in the early 1980s, political changes resulting from the end of the Cold War, the implementation of market-oriented economic and financial reforms in Eastern Europe, the East Asian and Latin American crises that have occurred since 1997, and the events flowing from 11 September 2001, indicate that the uncertainty associated with engaging in international businesses has increased substantially. Owing to the increased uncertainty arising from events in the last two decades, the associated risks have become more difficult to analyse and predict for decision makers in the economic, financial and political sectors (for further details see Hoti and McAleer (2004, 2005)).

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 particular country. As stated in Brewer and Rivoli (1990), perceptions of the determinants of country risk are important as they affect both 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 lending and investment 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 ratings 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 April 2004, 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. 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.

This paper analyses composite risk ratings and risk returns, as overall measures of country risk for Cyprus and Malta, the two representative SITEs in the Mediterranean region.

4. MULTIVARIATE MODELS OF CONDITIONAL VOLATILITY FOR TOURISM GROWTH AND COUNTRY RISK RETURNS

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

Two constant conditional correlation models, namely the no-spillover symmetric VARMA-GARCH model of Ling and McAleer (2003) and the asymmetric VARMA-GARCH (or VARMA-AGARCH) model of Hoti, Chan and McAleer (2002), 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:

$$y_t = E\left(y_t \mid \Im_{t-1}\right) + \varepsilon_t, \qquad t = 1,...,n$$

$$\varepsilon_t = D_t \eta_t \tag{1}$$

where $\Im_t$ is the information set available to time *t*, $y_t = (y_{1t},..., y_{mt})'$ 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 the standardisation $D_t = diag(h_{1t}^{1/2},...,h_{mt}^{1/2})$, $m\ (=4)$ is the number of monthly data series, and $t = 1,...,193$ monthly observations for the period May 1986 to May 2002.

The CCC 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 to tourism growth and risk return i, and β_{il} represents the GARCH effects, or the contribution of such shocks to long run persistence. 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 conditional volatility. It is important to note that $\Gamma = \{\rho_{ij}\}$ is the matrix of constant conditional correlations, in which $\rho_{ij} = \rho_{ji}$ 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 ($\varepsilon_t > 0$) has the same impact on the conditional variance, 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 the conditional variance between positive and negative shocks is given by

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

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), $\eta_t = \left(\eta_{1t},...,\eta_{mt}\right)'$ 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 multivariate effects across equations, and hence spillovers in volatility across different data series, it is necessary to define h_{it} to contain 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:

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

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

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. DATA DESCRIPTION

In this paper, we estimate multivariate conditional volatility models using monthly data on tourism growth and country risk returns for Cyprus and Malta. The two SITEs were selected as 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.

International tourist arrivals, tourism growth, country risk ratings, country risk returns and their associated sample volatility are presented in Figures 1-4. Volatility is defined as the squared deviation of each observation from its sample mean. Strong seasonal effects are observed in Figure 1 for international tourist arrivals to both SITEs, with increasing trends over the sample period. The country risk rating for Cyprus has a general increasing trend over the sample period, while the rating for Malta increased until 1998 and followed a decreasing trend to 2002. Figure 2 shows similar seasonal patterns for the sample volatilities of international tourist arrivals to both SITEs. However, the sample volatilities of country risk ratings are different for the two SITEs. While the volatility of Cyprus risk rating remained low after 1988, the volatility of Malta risk rating is bimodal.

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. 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 in Figure 3, 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 in Figure 4. Malta seems to be more volatile in tourism growth, while Cyprus seems to be more volatile in country risk returns.

6. EMPIRICAL RESULTS

Using the data on the four monthly data series, 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 univariate standardised shocks obtained from the multivariate models, the three 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 the four series in terms of the shocks to tourism growth and/or country risk return.

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. Using the RATS 6 econometric software package yielded virtually identical results. Tables 1-4 report the VARMA-GARCH and VARMA-AGARCH estimates for the four data series. Both the asymptotic and the Bollerslev-Wooldridge (1992) robust t-ratios are reported. In general, the robust t-ratios are smaller in absolute value than their asymptotic counterparts.

Tables 1-2 report the estimates of the VARMA-GARCH model for tourism growth and country risk returns for both Cyprus and Malta. The conditional mean estimates show significant dynamics for all four data sets. Estimates of the conditional variance in Table 1 show that tourism growth for Cyprus is affected by its own previous short run (α_{TG_C}) and long run (β_{TG_C}) shocks, and by previous long run shocks in risk returns for Cyprus (β_{CCR_C}) and tourism growth for Malta (β_{TG_M}). The country risk return for Cyprus is affected by its own previous long run (β_{CCR_C}) 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 (β_{CCR_M}) shock, and by previous short (α_{CCR_C}) and long (β_{CCR_C}) run shocks in the risk return for Cyprus.

Estimates of the VARMA-AGARCH model 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, the VARMA-GARCH model 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 (α_{TG_C}) and long run (β_{TG_C}) shocks, while tourism growth for Malta is affected by its own previous short (α_{TG_M}) and long run (β_{TG_M}) shocks, and previous long run shocks in tourism growth (β_{TG_C}) and country risk return (β_{CCR_C}) for Cyprus. Unlike the case of the VARMA-GARCH model, volatility spillover effects are observed from tourism growth and risk returns for Cyprus to tourism growth for Malta, but not the reverse.

Using the estimated standardised shocks to tourism growth and risk returns series 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. The conditional correlations range from 0.042 to 0.778 and 0.053 to 0.781 for VARMA-GARCH and VARMA-AGARCH, respectively. For both models, the highest conditional correlation holds between the two tourism growth series, followed by the two country risk return series. This implies that Cyprus and Malta are close substitutes only in terms of the shocks to their tourism growth rates.

7. CONCLUSION

Small Island Tourism Economies (SITEs) are developing 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 considered to have high risk. The main impediments to lend to small island economies are considered to be the costs of obtaining information and country risk.

This paper provided a comparison of tourism growth, country risk returns and their associated volatilities (or uncertainty) for 2 SITEs, namely Cyprus and Malta. Monthly data for both international tourist arrivals and composite country risk ratings compiled by the International Country Risk Guide (ICRG) were available for the period May 1986 to May 2002. The conditional variances of tourism growth and country risk returns for the 2 SITEs were analysed using multivariate models of conditional volatility. These models were able to capture the dynamics in the conditional variance and the existence of risk spillovers between tourism growth and country risk returns for Cyprus and Malta.

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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.

Figure 1: International Tourist Arrivals (TA) and Country Risk Returns (CRR) for Cyprus and Malta

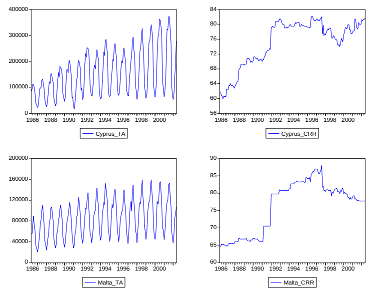

Figure 2: Volatility of International Tourist Arrivals (TA) and Country Risk Returns (CRR) for Cyprus and Malta

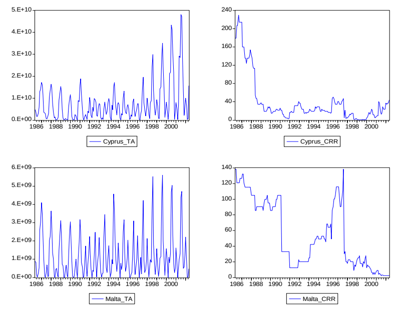

Figure 3: International Tourism Growth (TG) and Country Risk Returns (CRR) for Cyprus and Malta

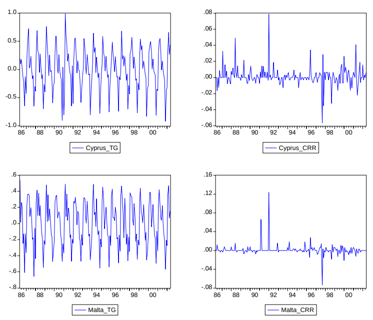

Figure 4: Volatility of Tourism Growth (TG) and Country Risk Returns (CRR) for Cyprus and Malta