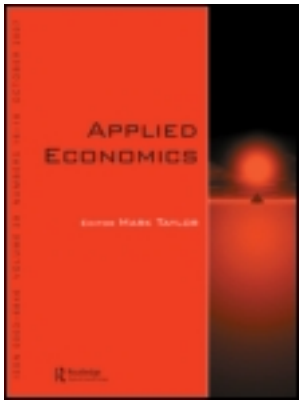

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Tourism, trade and growth: the case of Cyprus

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Tourism, trade and growth: the case of Cyprus

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Although the relationship between international trade and economic growth has found a wide application area in the literature over the years, this can not be said about tourism and growth or trade and tourism. This study employs the bounds test for cointegration and Granger causality tests to investigate a long-run equilibrium relationship between tourism, trade and real income growth, and the direction of causality among themselves for Cyprus. Results reveal that tourism, trade and real income growth are cointegrated; thus, a long-run equilibrium relationship can be inferred between these three variables. On the other hand, Granger causality test results suggest that real income growth stimulates growth in international trade (both exports and imports) and international tourist arrivals to the island. Furthermore, growth in international trade (both exports and imports) also stimulates an increase in international tourist arrivals to Cyprus. And finally, real import growth stimulate growth in real exports in the case of Cyprus.

I. Introduction

International tourism and international trade are two major sources of foreign exchange for small countries as well as the larger ones. Small countries, in particular small islands, have more dependency on tourism and trade than the larger ones since their economies are based on only a few sectors. Especially, export-oriented services tend to represent unique characteristics of small islands and therefore, provide a basis for a potential comparative advantage (Mehmet and Tahiroglu, 2002). There are huge amount of studies investigating empirical relationship between international trade and economic growth (especially, trade-led, export-led and import-led growth hypotheses), but this cannot be said about empirical relationship between international tourism and economic growth (Gunduz and Hatemi-J, 2005), and even between international tourism and international trade. Furthermore, results of the studies made for the relationship between international trade, international tourism and economic growth are still inconclusive (see also Gunduz and Hatemi-J, 2005).

There is an unverified question of whether international tourism and trade (exports and imports) growth actually causes economic growth or does economic growth contributes to tourism and trade growth instead. Empirical studies of the relationship between tourism and economic growth have been less rigorous in the tourism literature (Oh, 2005). International tourism receipts are major source of foreign exchange together with export revenues that well compensate current account deficits as well due to the fact that tourism spending serves as an alternative form of exports contributing to ameliorated balance of payments in many countries (Oh, 2005). On the other hand, since international tourism contributes to every sector of the economies, budget deficits also benefits from these activities via tax revenues. As McKinnon (1964) argues

international tourism brings foreign exchange that can be used to import intermediate and capital goods to produce goods and services, which in turn leads to economic growth. Balaguer and Jorda (2002) prove the validity of tourism-led hypothesis for the Spanish economy, where the Spanish economy is the second largest recipient of international tourist earnings (5.9% of its GDP) in the world after the United States. However, there is a question if this hypothesis can be proved for other countries. Therefore, the tourism-led hypothesis deserves further attention for the other economies.

On the other hand, many studies in the literature proved the importance of international trade for economic growth as well. Although results on the direction of relationship between international trade and economic growth are still again inconclusive (Balaguer and Jorda, 2002), empirical studies prove that international trade is crucial for economic growth of many countries (Chow, 1987; Marin, 1992; Bahmani-Oskooee and Alse, 1993; Jin, 1995; Xu, 1996; Shan and Sun, 1998). Recent theoretical literature provides two main mechanisms through which international trade may affect growth. The first is its effect on the rate of innovation. The second is its effect on the adoption rate of technologies from more advanced countries that also increases the economy's rate of total factor productivity growth (Proudman *et al*., 1998). Extensive empirical studies in the literature have adopted the concept of causality proposed by Granger (1969) and Sims (1972) to detect the causal relationship between exports and output. Many of the studies in the empirical literature show conflicting results. Furthermore, although exports are a component of GDP and thus lead directly to the growth of output, while some studies found support for the export-led growth (ELG) hypothesis (i.e. Chow, 1987; Bahmani-Oskooee and Alse, 1993; Xu, 1996), some others have found negative relationship, even for the economies that are well known for their export promoting policies (i.e. Jung and Marshall, 1985; Darrat, 1986; Ahmed and Kwan, 1991; Dodaro, 1993). Furthermore, some empirical studies in the literature confirmed the trade-led growth (TLG) hypothesis for some countries whereas some others rejected it for some other countries, while, on the other hand, some studies in the growth literature support the ELG hypothesis and while some others investigate the import-led growth (ILG) hypothesis (Deme, 2002). Exports and imports were also linked to each other in the empirical literature. Narayan and Narayan (2005) indicate that exports and imports are cointegrated only for 6 out of the 22 least developed countries, and the coefficient on exports is < 1. Arize (2002), on the other hand, found that for 35 of the 50 countries there was evidence of co-integration between exports and imports; and 31 of the 35 countries had a positive export coefficient.

The linkages between international tourism and international trade did not find a wide application area in the literature (see Shan and Wilson, 2001). Do international tourist arrivals promote international trade or does international trade promote tourist arrivals, or is there feedback causality among them? When international tourism leads to international trade, there will be an increase in import demand for foreign goods/services as well as an increase in export earnings through its service account of balance of payments. Another implication of international tourism for international trade is that it increases the image of domestic goods/services in international markets, which create new trade opportunities (Kulendran and Wilson, 1998; Shan and Wilson, 2001). On the other hand, when international trade leads to a growth in international tourism, this might happen through business travel, which in turn causes holiday travels at later stages as a result of greater trade opportunities. Therefore, the relationship between international tourism and international trade is another issue that deserves further attention from the researchers (Kulendran and Wilson, 2000).

Aim and importance of the study

Having the importance of these issues mentioned above that deserves further attention, this study empirically investigates the possible cointegration and causal link between international tourism, international trade (including exports and imports) and economic growth in a small island, the south of Cyprus, which has become a new member to European Union (EU) apart from 1 May 2004 and is a developed country with 15.1 billion US$ GDP and 20 701 US$ per capita income as of 2004 figures (Statistical Service, 2005).

Cyprus enjoys a wide range of natural resources in terms of landscape, traditional folklore, gastronomy, culture and a pleasant climate. Over the last 40 years, it has emerged as a major Mediterranean summer-sun destination (Sharpley, 2002). The successful growth of international tourism underpinned a remarkable socio-economic development on the island (Ioannides, 1992; Kammas and Salehi-Esfahani, 1992; Seekings, 1997; Ayers, 2000; Sharpley, 2002;).

There are important implications and motivations for doing this study: first, international trade plays an extremely important role amidst economic concerns. However, little mention is of international tourism, in

spite of its importance among foreign expenditure items (Luzzi and Flückiger, 2003) and majority of empirical studies on tourism forecasting were built on tourism demand functions. As Shan and Wilson (2001) mention, several areas remain incomplete in this sort of studies and hence deserve further studies. For example, the role of international trade as one of the determinants of tourism demand is not well recognized in these studies. Thus, this study will search the relationship of not only international tourism growth with economic growth but also with international trade growth in a small island.

Second, the econometric techniques used in the previous studies of international tourism are generally poor lacking new developments in econometrics such as cointegration and Granger causality concepts (Witt and Witt, 1995; Lim, 1997; Song *et al*., 1997; Shan and Wilson 2001). Additionally, this study is unique in the sense that it for the first time searches the link between international tourism, international trade and economic growth triangle at the same time by employing the latest econometric techniques in the field, where previous empirical studies in the literature considered the link between any pair of them for particular countries (Andrew, 1997; Wagner, 1997; Zhou *et al*., 1997; Clancy, 1999; Shan and Wilson, 2001; Oh, 2005) till the moment.

Third, another implication of this study is that although there have been numerous studies (Andronikou, 1987; Ioannides, 1992; Clements and Georgiou, 1998; Ayers, 2000; Cope, 2000; Ioannides and Holcomb, 2001; Sharpley, 2002; Sharpley and Forster, 2003) analysing the development and management of tourism in Cyprus; however, none of them has considered its impact on economic growth and international trade. Furthermore, there are very few studies analysing international trade and its effect on economic growth of Cyprus (Asseery and Perdikis, 1991; Ayers, 1999; Pattichis, 1999; Andrikopoulos and Loizides, 2000). Therefore, empirical studies deserve attention to be made for the South Cyprus economy. Yet, the results of this study for the first time are expected to give important implications for this island economy.

And fourth, Cyprus problem has been at the agenda of world countries for more than 40 years. Now, the south of Cyprus became a member of the EU whereas the north of the island does not benefit the EU regulations. Thus, this situation will continue to deserve attention from the world countries and the results of this study are also expected to give important messages to policy makers.

The paper proceeds as follows. Section II defines data and methodology of the study. Section III provides results and discussions and the paper concludes with Section IV.

II. Data and Methodology

Data used in this article are annual figures covering the period 1960–2005 and variables of the study are real GDP, real trade volume (exports plus imports), real exports of goods and services, real imports of goods and services and total number of international tourists visiting and accommodating in tourist establishments of Cyprus. Exports and imports were also considered separately in the study in addition to trade volume. Data are taken from World Bank Development Indicators (World Bank, 2006) and Statistical Service of Cyprus (Statistical Service, 2005) and variables except tourists are all at 2000 constant US $ prices.

The Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP)[1] Unit Root Tests are employed to test the integration level and the possible cointegration among the variables (Dickey and Fuller, 1981; Phillips and Perron, 1988). The PP procedures, which compute a residual variance that is robust to auto-correlation, are applied to test for unit roots as an alternative to ADF unit root test.

Perron (1989, 1990) and Perron and Vogelsang (1992) suggest that a structural break in the mean of a stationary variable is more likely to bias the DF-ADF tests towards the nonrejection of the null of a unit root in the process. Perron (1990) argues that ignoring the effects of structural breaks can lead to inadequate model specifications, poor forecast, spurious unit root test results and improper policy implications. Thus, Perron (1990) proposes an integration level test for structural break, which is known as the 'Perron test' and provides the appropriate critical values.[2] In this study, Perron (1990) test was employed to see if the order of integration is changed by the structural break. The use of the Perron (1990) test in this study is justified by the fact that intervention of Turkey in 1974 had significant effects on the Cypriot economy. Perron (1990) test was carried out in two steps.

[1] PP approach allows for the presence of unknown forms of autocorrelation with a structural break in the time series and conditional heteroscedasticity in the error term.
[2] Rybinski (1994) also provides the appropriate critical values for small samples.

First, residuals were estimated using OLS (ordinary least squares) as follows:

$$X_t = \mu + \delta DU_t + \varepsilon_t \quad (1)$$

Where $DU_t = 1$ if $t > T_b$ and 0 otherwise. T_b is the point where the break occurs. And second, the following modified regression models were run by using OLS. The test of negativity of γ is checked by using appropriate critical values reported in the study of Rybinski (1994, 1995):

$$\Delta\varepsilon_t = \sum_{i=0}^{K} \phi_i (DUTB)_{t-i} + \gamma\varepsilon_{t-1} + \sum_{i=1}^{K} \alpha_i \Delta\varepsilon_{t-i} + u_t \quad \text{(level)} \quad (2)$$

$$\Delta\Delta\varepsilon_t = \sum_{i=0}^{K} \phi_i (DUTB)_{t-i} + \gamma\Delta\varepsilon_{t-1} + \sum_{i=1}^{K} \alpha_i \Delta\Delta\varepsilon_{t-i} + u_t \quad \text{(first difference)} \quad (3)$$

Where $(DUTB)_t = 1$ if $t = T_b + 1$ and 0 otherwise. T_b is the break year (1974 in this study), $DUTB$ is dummy variable for the break year, ε_t is the residual obtained from Equation 1 using OLS and u_t is the error term.

To investigate a long-run relationship between each pair of variables under consideration, the bounds test for cointegration within ARDL (the autoregressive distributed lag) modelling approach was adopted in this study. This model was developed by Pesaran *et al*. (2001) and can be applied irrespective of the order of integration of the variables (irrespective of whether regressors are purely I (0), purely I (1) or mutually cointegrated). The ARDL modelling approach involves estimating the following error correction models:

$$\Delta \ln Y_t = a_{0_Y} + \sum_{i=1}^{n} b_{i_Y} \Delta \ln Y_{t-i} + \sum_{i=1}^{n} c_{i_Y} \Delta \ln X_{t-i} + \sigma_{1_Y} \ln Y_{t-1} + \sigma_{2_Y} \ln X_{t-i} + \varepsilon_{1t} \quad (4)$$

$$\Delta \ln X_t = a_{0_X} + \sum_{i=1}^{n} b_{i_X} \Delta \ln X_{t-i} + \sum_{i=1}^{n} c_{i_X} \Delta \ln Y_{t-i} + \varpi_{1_X} \ln X_{t-1} + \varpi_{2_X} \ln Y_{t-i} + \varepsilon_{2t} \quad (5)$$

In Equations 4 and 5, Δ is the difference operator, Y_t is the log of dependent variable, X_t is the log of independent variable and ε_{1t} and ε_{2t} are serially independent random errors with mean zero and finite covariance matrix.

Again in Equations 4 and 5, the F-test is used for investigating one or more long-run relationships. In the case of one or more long-run relationships, the F-test indicates which variable should be normalized. In Equation 4, when Y is the dependent variable, the null hypothesis of no cointegration is $H_0: \sigma_{1Y} = \sigma_{2Y} = 0$ and the alternative hypothesis of cointegration is H_1: $\sigma_{1Y} \neq \sigma_{2Y} \neq 0$. On the other hand, in Equation 5, when X is the dependent variable, the null hypothesis of no cointegration is H_0: $\bar{\omega}_{1Y} = \bar{\omega}_{2Y} = 0$ and the alternative hypothesis of cointegration is H_1: $\bar{\omega}_{1Y} \neq \bar{\omega}_{2Y} \neq 0$.

In the case of cointegration based on the bounds test, the Granger causality tests should be done under vector error correction model (VECM) when the variables under consideration are cointegrated. By doing so, the short-run deviations of series from their long-run equilibrium path are also captured by including an error correction term (See also Narayan and Smyth, 2004). Therefore, error correction models of cointegration can be specified as follows:

$$\Delta \ln Y_t = \alpha_0 + \varphi^p_{11}(L)\Delta \ln Y_t + \varphi^q_{12}(L)\Delta \ln X_t + \delta ECT_{t-1} + \mu_{1t} \quad (6)$$

$$\Delta \ln X_t = \alpha_1 + \varphi^p_{21}(L)\Delta \ln X_t + \varphi^q_{22}(L)\Delta \ln Y_t + \delta ECT_{t-1} + \mu_{2t} \quad (7)$$

Where

$$\varphi^p_{ij}(L) = \sum_{n=1}^{P_{ij}} \varphi_{ijn} L^1 \quad \varphi^q_{ij}(L) = \sum_{n=1}^{Q_{ij}} \varphi_{ijn} L^1$$

In Equations 6 and 7, Δ denotes the difference operator and L denotes the lag operator where $(L)\Delta \ln Y_t = \Delta \ln Y_{t-1}$. ECT_{t-1} is the lagged error correction term derived from the long-run cointegration model. Finally, μ_{1t} and μ_{2t} are serially independent random errors with mean zero and finite covariance matrix. Finally, according to the VECM for causality tests, having statistically significant F and t ratios for ECT_{t-1} in Equations 6 and 7 would be enough condition to have causation from X to Y and from Y to X, respectively.

III. Results and Discussions

Table 1 gives ADF and PP unit root test results for the variables of the study. Real GDP seems to be

Table 1. ADF and PP tests for unit root

Statistics (Level)	$\Delta\ln y$	Lag	$\Delta\ln T$	Lag	$\Delta\ln$ Tour	lag	$\Delta\ln X$	lag	$\Delta\ln M$	lag
τ_T (ADF)	−3.24***	(1)	−1.38	(2)	−3.36***	(0)	−0.77	(2)	−2.89	(0)
τ_μ (ADF)	−0.66	(2)	−1.85	(2)	−1.14	(2)	−2.44	(2)	−1.47	(2)
τ (ADF)	3.02	(2)	2.89	(2)	1.90	(2)	1.63	(2)	2.93	(2)
τ_T (PP)	−2.76	(4)	−2.30	(3)	−3.34***	(1)	−1.39	(5)	−2.81	(2)
τ_μ (PP)	−1.11	(9)	−2.41	(25)	−1.63	(10)	−2.41	(11)	−2.11	(31)
τ (PP)	5.45	(8)	3.34	(12)	2.77	(16)	1.60	(6)	3.83	(17)
Statistics (First difference)										
τ_T (ADF)	−4.81*	(1)	−5.45*	(3)	−6.21*	(1)	−5.40*	(3)	−6.96*	(1)
τ_μ (ADF)	−4.86*	(1)	−7.05*	(1)	−6.22*	(1)	−6.60*	(1)	−6.86*	(1)
τ (ADF)	−4.31*	(0)	−5.74*	(1)	−8.03*	(0)	−6.16*	(1)	−6.29*	(0)
τ_T (PP)	−6.04*	(12)	−19.13*	(43)	−12.46*	(12)	−16.16*	(43)	−19.69*	(43)
τ_μ (PP)	−6.10*	(11)	−7.73*	(16)	−11.30*	(9)	−6.36*	(7)	−8.86*	(23)
τ (PP)	−4.27*	(1)	−6.20*	(1)	−8.06*	(1)	−5.97*	(3)	−6.29*	(1)

Notes: y represents real GDP; T is real trade volume; Tour is total tourist arrivals to Cyprus; X is total real exports; and finally, M is total real imports. All of the series are at their natural logarithms. τ_T represents the most general model with a drift and trend; τ_μ is the model with a drift and without trend; τ is the most restricted model without a drift and trend. Numbers in brackets are lag lengths used in ADF test (as determined by AIC set to maximum three) to remove serial correlation in the residuals. When using PP test, numbers in brackets represent Newey-West Bandwith (as determined by Bartlett–Kernel). Both in ADF and PP tests, unit root tests were performed from the most general to the least specific model by eliminating trend and intercept across the models (see Enders, 1995: 254–55). Tests for unit roots have been carried out in E-VIEWS 5.1. * and *** denote rejection of the null hypothesis at the 1 and 10% levels, respectively.

stationary in ADF test at level but this is not justified by PP test. The second test (PP) will be taken into consideration in this study due to the fact that PP procedures compute a residual variance that is robust to auto-correlation and are applied to test for unit roots as an alternative to ADF unit root test. Furthermore, both tests reveal that real trade volume, real exports and real imports are nonstationary at their levels but stationary at their first differences. Thus, they are said to be integrated of order one, I(1) together with real GDP. On the other hand, international tourist arrivals seem to be stationary at level, that is, integrated of order zero, I(0), as justified by both ADF and PP tests.

Table 2 reports Perron (1990) unit root tests for structural break that might be statistically significant in the year of 1974. Perron (1990) reveals that no break is observed in any of the variables in this study since Perron (1990) test statistics are less than critical values as reported by Rybinski (1994, 1995). Thus, this shows that unit root test results reached by ADF and PP tests are robust in this study.

Now having the fact that international tourist arrivals' variable is stationary at level while others are stationary at their first difference, a long-run equilibrium relationship will be now investigated by using the bounds test for cointegration within ARDL modelling approach. Table 3 gives results of the bounds test for cointegration between international trade variables, international tourist arrivals and real income for Cyprus under three different scenarios as also suggested by Pesaran *et al*. (2001: pp. 295–96), that are with restricted deterministic trends (F_{IV}), with unrestricted deterministic trends (F_V) and without deterministic trends (F_{III}). Intercepts in

Table 2. Perron (1990) unit root test for structural break

		Test statistics		
Variables	Break year	Levels	1st Differences	Critical value and lambda (5%); $\lambda = 0.34$
$\ln y_t$	1974	−1.62	−4.53	−3.49
Ln T_t	1974	−2.71	−5.74	−3.49
$\ln Tour_t$	1974	−2.08	−5.11	−3.49
$\ln X_t$	1974	−3.21	−6.04	−3.49
$\ln M_t$	1974	−2.57	−5.62	−3.49

Notes: Perron (1990) suggested (i) the additive outlier model, which is recommended for series exhibiting a sudden change in mean, and (ii) innovation outlier model, which is suggested for a gradual change in the series (see also Perron and Vogelsang, 1992). The additive outlier model was used in this study due to the fact that intervention of Turkey in 1974 was a sudden event. The critical value reported by Rybinski (1994) was used instead of the original critical value reported by Perron. The corresponding break fraction for 44 observations was calculated easily with $\lambda = (T_b/T)$ (see Perron and Vogelsang, 1992). For 1974 (1), the relevant break year fractions are $\lambda = 15/44 = 0.34$ (−3.49). And, no augmentation appeared to be sufficient to secure lack of auto-correlation of the error terms.

Table 3. Critical values for ARDL modelling approach

	0.10		0.05		0.01	
$k=2$	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
F_{IV}	3.38	4.02	3.88	4.61	4.99	5.85
F_V	4.19	5.06	4.87	5.85	6.34	7.52
F_{III}	3.17	4.14	3.79	4.85	5.15	6.36
t_V	−3.13	−3.63	−3.41	−3.95	−3.96	−4.53
t_{III}	−2.57	−3.21	−2.86	−3.53	−3.43	−4.10

Source: Pesaran *et al.* (2001): pp. 300–301 for *F*-statistics and pp. 303–304 for *t* ratios.
Notes: k is the number of regressors for dependent variable in ARDL models, F_{IV} represents the F statistic of the model with unrestricted intercept and restricted trend, F_V represents the F statistic of the model with unrestricted intercept and trend, and F_{III} represents the F statistic of the model with unrestricted intercept and no trend. t_V and t_{III} are the t ratios for testing $\sigma_{1Y}=0$ in Equation 5 and $\bar{\omega}_{1Y}=0$ in Equation 6, respectively with and without deterministic linear trend.

these scenarios are all unrestricted.[3] Critical values for F and t statistics are presented in Table 3 as taken from Pesaran *et al.* (2001) to be used in this study.

Results in Table 4 suggest that the application of the bounds F-test using ARDL modelling approach generally suggest the existence of a level relationship (a long-run relationship) between each pair of dependent variable and its regressor since the null hypotheses of $H_0: \sigma_{1Y}=\sigma_{2Y}=0$ and $H_0: \bar{\omega}_{1Y}=\bar{\omega}_{2Y}=0$ are rejected at 0.01, 0.05 or 0.10 levels. On the other hand, the results from the application of the bounds t-test in each ARDL model are less clear-cut and do not generally allow the imposition of the trend restrictions in the models, since they are not significant except t_{III} ratios in $(Tour/T)$ and $(Tour/M)$ relationships in Table 4 (see Pesaran *et al.*, 2001: p. 312).

On the basis of the bounds test results for cointegration, the Granger causality tests require a VECM in the case of each pair of variables under consideration. There are methods for lag length selection in the recent literature such as AIC (Akaike Information), SIC (Schwartz Information Criterion) and Hsiao's (1979) sequential procedure (which combines Granger's definition of causality and Akaike's minimum final prediction error (FPE) criterion). However, due to the limited number of observations in this study, maximum lag is set to three and VECM models were estimated for each lag length. Pindyck and Rubinfeld (1991) also point out that it would be best to run the test for a few different lag structures and make sure that the results were not sensitive to the choice of lag length.

Results of the VECM in Table 5 suggest causal relationships among the variables under consideration. First, unidirectional causation from real GDP growth to trade volume, exports and imports of goods and services and international tourist arrivals was obtained in the study. Other unidirectional causalities in the study were observed from real imports to real exports, from trade volume to total number of tourist arrivals, from exports to total number of tourist arrivals, and finally from imports to total number of tourist arrivals.

The results obtained from this study are consistent with those in the study of Shan and Sun (1998) and Panas and Vamvoukas (2002) where they found a causation from output growth to export performance in the long-run for Greece and Australia. However, these results are not consistent with those of Fountas (2000), Abual-Foul (2004), Siliverstovs and Herzer (2006). The result of this study that international tourist arrivals Granger cause to international trade is different from the study of Shan and Wilson (2001) where they found bidirectional causation among these in the case of China, but similar to the findings of Kulendran and Wilson (2000) where they found unidirectional causation from real total trade to total travel in the case of USA and UK.

IV. Conclusion

This study empirically tested the possibility of long-run equilibrium relationship and direction of causality between international trade, international tourist arrivals and real income growth in Cyprus. Results of the bounds test for cointegration reveal that a long-run equilibrium relationship was

[3] For detailed information, please refer to Pesaran *et al.* (2001), pp. 295–96.

Table 4. The bounds test for cointegration

Variables	With deterministic trends			Without deterministic trend		Conclusion
	F_{IV}	F_V	t_V	F_{III}	t_{III}	
						H_0
(1) y and T						
F_y (y/T)	12.25[c]	3.69[a]	−2.77[a]	10.76[c]	−1.51[a]	Rejected
F_T (T/y)	11.19[c]	8.77[c]	−1.67[a]	11.44[c]	−2.06[a]	Rejected
(2) y and X						
F_y (y/X)	4.86[c]	4.01[a]	−2.10[a]	3.83[b]	−0.96[a]	Rejected
F_X (X/y)	5.13[c]	4.85[b]	−1.94[a]	5.63[c]	−1.78[a]	Rejected
(3) y and M						
F_y (y/M)	15.36[c]	12.47[c]	−2.48[a]	13.22[c]	−1.48[a]	Rejected
F_M (M/y)	13.09[c]	10.76[c]	−2.03[a]	13.22[c]	−2.09[a]	Rejected
(4) y and *Tour*						
F_y ($y/Tour$)	23.99[c]	19.46[c]	−2.45[a]	18.36[c]	−0.25[a]	Rejected
F_{Tour} ($Tour/y$)	20.99[c]	17.09[c]	−1.32[a]	19.98[c]	−1.27[a]	Rejected
(5) T and *Tour*						
F_T ($T/Tour$)	11.68[c]	9.72[c]	−2.63[a]	10.49[c]	−2.26[a]	Rejected
F_{Tour} ($Tour/T$)	13.07[c]	10.64[c]	−2.76[a]	13.11[c]	−3.27[c]	Rejected
(6) X and *Tour*						
F_X ($X/Tour$)	5.02[c]	4.58[b]	−1.61[a]	5.44[c]	−1.87[a]	Rejected
F_{Tour} ($Tour/X$)	6.62[c]	5.39[c]	−2.77[a]	5.50[c]	−2.39[a]	Rejected
(7) M and *Tour*						
F_M ($M/Tour$)	13.94[c]	11.43[c]	−3.20[b]	11.62[c]	−2.44[a]	Rejected
F_{Tour} ($Tour/M$)	15.14[c]	12.29[c]	−3.09[a]	14.91[c]	−3.38[c]	Rejected
(8) X and M						
F_X (X/M)	11.48[c]	10.39[c]	−0.95[a]	12.79[c]	−1.29[a]	Rejected
F_M (M/X)	16.42[c]	13.46[c]	−2.96[a]	12.29[c]	−0.79[a]	Rejected

Notes: Akaike Information Criterion (AIC) and Schwartz Criteria (SC) were used to select the number of lags required in the cointegration test. Both gave the same level of lag order, VAR = 1. F_{IV} represents the F statistic of the model with unrestricted intercept and restricted trend, F_V represents the F statistic of the model with unrestricted intercept and trend, and F_{III} represents the F statistic of the model with unrestricted intercept and no trend. t_V and t_{III} are the t ratios for testing $\sigma_{1Y} = 0$ in Equation 5 and $\bar{\omega}_{1Y} = 0$ in Equation 6, respectively with and without deterministic linear trend.

[a]indicates that the statistic lies below the lower bound.

[b]that it falls within the lower and upper bounds.

[c]that it lies above the upper bound.

confirmed between international trade, international tourism and economic growth in the case of Cypriot economy by using ARDL modelling approach. The main finding of this study as can be also seen from Fig. 1 that growth in real income stimulates growth in international trade (both exports and imports) and international tourist arrivals to the island. Furthermore, growth in international trade (both exports and imports) also stimulates an increase in international tourist arrivals to Cyprus. These results can be justified by the fact that a growth in real output leads to a growth in R&D, advertising and promotion facilities and capacities in tourism sector as well; thus, this attracts more international tourists from the other countries. On the other hand, capital investments in sectors increases as a result of growth in trade sectors, mainly in imports. Thus, growth in tourism based investments and tourism capacity stimulates also growth in international tourist arrivals. Business travels also are important part of tourism sector in every country. Shan and Wilson (2001) and Kulendran and Wilson (1998) argue that more foreign tourists to a host country generally increases the image of the country for its goods and services; thus, trade opportunities are likely to increase. In 2004, 89.4% of tourists visited Cyprus for holiday purpose where 5.9% of them visited for business and 4.5% visited for friends and relatives (Statistical Service, 2005).

This study has shown that still there is a need to evaluate the relationship of international tourism with international trade and economic growth as some of the results of this study are consistent where some others are conflicting with other studies in the relevant literature. Therefore, a further study is recommended to do a similar study for other islands

Table 5. Granger causality tests

Lag level null hypothesis	1 *F*–Stat	 t_{ECT-1}	2 *F*–Stat	 t_{ECT-1}	3 *F*–Stat	 t_{ECT-1}	Result
(1) *y* and *T*							
T does not Granger cause *y*	0.47	0.27	0.63	0.53	2.22**	0.83	$y \Rightarrow T$
y does not Granger cause *T*	1.10	−1.75***	2.17***	−1.70***	2.14***	−1.91***	
(2) *y* and *Tour*							
Tour does not Granger cause *y*	3.57**	1.65	2.48**	1.22	2.37**	0.92	$y \Rightarrow Tour$
y does not Granger cause *Tour*	4.64*	−2.13**	3.22**	−1.54	2.35**	−1.16	
(3) *T* and *Tour*							
Tour does not Granger cause *T*	0.65	0.05	2.81**	1.48	1.61	0.16	$T \Rightarrow Tour$
T does not Granger cause *Tour*	3.17**	−2.35**	4.08*	−3.48*	3.00**	−2.21**	
(4) *y* and *X*							
X does not Granger cause *y*	0.57	0.03	0.48	−0.30	1.68	−0.24	$Y \Rightarrow X$
y does not Granger cause *X*	2.92**	−2.19**	3.94*	−2.45**	2.84**	−2.26**	
(5) *y* and *M*							
M does not Granger cause *y*	1.23	0.45	1.09	0.51	2.30***	0.88	$Y \Rightarrow M$
y does not Granger cause *M*	1.36	−1.76***	1.92	−1.48	1.99***	−1.72***	
(6) *Tour* and *X*							
Tour does not Granger cause *X*	2.33***	−1.43	3.83*	1.70	2.65**	−1.57	$X \Rightarrow Tour$
X does not Granger cause *Tour*	2.38	−1.38	3.81*	−3.20*	2.85**	−1.32	
(7) *Tour* and *M*							
Tour does not Granger cause *M*	0.26	0.12	1.93	1.10	1.18	0.50	$M \Rightarrow Tour$
M does not Granger cause *Tour*	2.93**	−2.33**	3.27**	−3.03*	2.34**	−2.22**	
(8) *X* and *M*							
X does not Granger cause *M*	4.10**	0.50	3.33**	−0.46	3.14**	−0.08	$M \Rightarrow X$
M does not Granger cause *X*	4.67*	−2.09**	4.79*	−2.28**	3.64*	−2.01***	

*, ** and *** significance at 1, 5 and 10% levels, respectively.

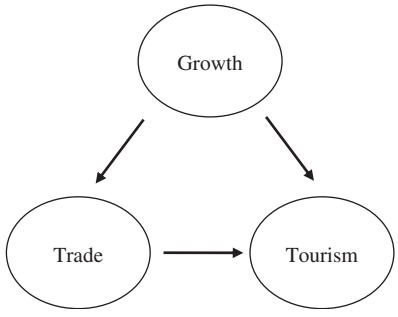

Fig. 1. Trade, tourism and growth triangle in cyprus

around the world for the purpose of comparison with the results of this study.

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