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Competitive and Complementary Relations in International Travel: The Case of British Travel to Cyprus

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Abstract: This is an econometric analysis of demand for travel to Cyprus by Britons. We examined the competitive and complementary relations between travel to Cyprus and other well-established travel destinations in the Mediterranean basin. Because many package tours include several countries in their destinations within a given journey, and because individual travelers find it more advantageous to visit more than one country in a single trip, it may be meaningful to examine international travel within the contest of groups of countries rather than a single country competing for international travelers. Specifically, we provide an analysis of the competitive and complementary relations existing between the tourism sectors of Cyprus and that of Greece, Spain and Portugal for British travelers. We provide estimates of income and relative price elasticities based of export demand equations upon annual data from 1980-2016. We tested for the stationarity of the variables and derived estimates of the Vector Error Correction Model (VECM). These tests confirm a strong association between the incomes of Britons and their decision to travel to Cyprus. Furthermore, we show the relative prices between Cyprus and other competing destinations in the Mediterranean to play an important role in determining British travel to Cyprus.

Key words: British travel to Cyprus; econometric analysis of international travel; tourism demand
JEL codes: A10, C01, C10, 19, C22, D12, F10, F14, Z30, Z39

1. Introduction

International tourism is the single most important export industry of the island of Cyprus located in the Southeastern corner of the Mediterranean Sea. On the average over the most recent years, revenues from tourism account approximately for 20% of total exports and 12% of the island's GDP (Table 1). Visitors from the UK are by far the most important international travelers to Cyprus that account, at times, for more than 50 percent of the total international arrivals to the island (Table 2).

Nevertheless, this important source for revenues and economic activity for Cyprus is prone to cyclical economic fluctuations and heavily influenced by the competitiveness of similar tourist destinations in the region as well as the political climate that has often been in turmoil in the neighboring areas.

Political instability and conflicts in the region, as well as world economic recessions have at times

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interrupted a steady and sturdy growth in tourist arrivals (see 1990-1992 and 2002-2004 in Figure 1) with serious consequences in revenues and employment affecting the island's entire economy.

Table 1 Tourist Receipts as a Share of Exports and GDP of Cyprus

Year	Cyprus exports as a % of GDP	Tourism receipts as a % of exports	Tourism receipts as a % of GDP
2005	56%	21%	12%
2006	53%	21%	11%
2007	53%	20%	11%
2008	50%	19%	9%
2009	49%	16%	8%
2010	50%	16%	8%
2011	53%	17%	9%
2012	53%	19%	10%
2013	59%	20%	11%
2014	62%	19%	11%
2015	65%	18%	12%
2016	65%	20%	13%
2017	64%	22%	14%

Table 2 UK Arrivals to Cyprus

Year	Total tourist arrivals	Tourist arrivals from UK	Share of UK tourist arrivals
2005	2,470,063	1,391,849	56%
2006	2,400,924	1,360,136	57%
2007	2,416,081	1,282,873	53%
2008	2,403,750	1,242,655	52%
2009	2,141,193	1,069,196	50%
2010	2,172,998	996,046	46%
2011	2,392,228	1,020,709	43%
2012	2,464,908	959,463	39%
2013	2,405,390	891,233	37%
2014	2,441,239	871,523	36%
2015	2,659,405	1,041,208	39%
2016	3,186,531	1,157,978	36%
2017	3,652,073	1,253,839	34%

Tourism is a multifaceted industry encompassing several sectors of the economy and many non-economic factors such as political, sociological, and cultural, which may affect its growth and ordinary functioning. This study, however, will exclusively address the economic only aspects of tourism in Cyprus that affect arrivals of British travelers. The study presents a demand equation model along the lines of econometric modeling listed in the earliest literature Gray H. P. (1966) and numerus reviews by Archer H. (1976), Calatone (1987), Crouch (2000) and others. Furthermore, these models are extensions of the econometric models initially employed in studies of international trade by the pioneer in econometrics Jan Tinbergen and other researchers in the 50s and 60s, Anastasopoulos (1997), Cheng (1959). As a result, we examine the role incomes in the UK will influence the decisions of Britons to travel to Cyprus, as well as the relative prices between Cyprus and other competing destinations in the Mediterranean region. Finally, we tests the validity of our results by examining the stationarity of our variables, as well as the extent to which our explanatory variables of income and relative prices exhibit long-run and short-run associations with the dependent variable of British arrivals.

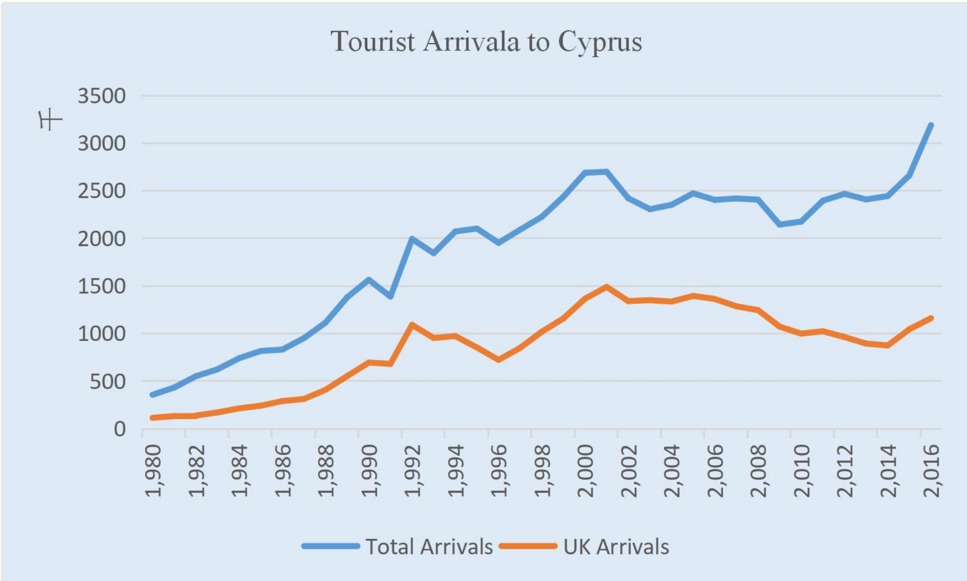

Figure 1 Tourist Arrivals to Cyprus 2005-2016

2. Methodology

The model of the study is a typical export equation model similar to the export models of travel used in econometric studies over the last 70 years.

It is as follows:

$$LARuk(t) = \beta 0 + \beta 1 LukY(t) + \beta 2 LPj(t) + U(t) \quad (1)$$

Where t = time period (years 1980-2016)

$\beta 0$ = constant

$\beta 1, \beta 2$ = Income and price elasticity coefficients

$LARuk(t)$ = Logarithm of British tourist arrivals to Cyprus $[ARuk(t)]$ in years (t)

$LukY(t)$ = Logarithm of real per capita Gross Domestic Product of UK $[ukY(t)]$ in period (t) in 2010 British Pounds.

$LPj(t)$ = logarithm of the relative prices of Cyprus (Pj) with other related to Cyprus tourist destinations (j)in period (t).

For example, we expressed the relative prices between Cyprus and Greece $Pgr(t)$as follows,

$$Pgr(t) = \left[\frac{CPIcyp(t)}{CPIgr(t)}\right] x \left[\frac{EXRgr(t)}{EXRcyp(t)}\right].$$

Similarly, we express the relative prices between Cyprus and Portugal $Ppor(t)$ as follows,

$$Ppor(t) = \left[\frac{CPIcyp(t)}{CPIpor(t)}\right] x \left[\frac{EXRpor(t)}{EXRcyp(t)}\right].$$

Where,

$CPIcyp(t)$ = Consumer Price Index of Cyprus in period (t)

$CPIgr(t)$ = Consumer Price Index of Greece in period (t)

$CPIpor(t)$ = Consumer Price Index of Portugal in period (t)

$EXRcyp(t)$ = Exchange Rate of Cyprus, expressed in Cypriot currency units (Cypriot Pounds up until December 31 of 2007 and Euros thereafter) per US Dollar in period (t).

$EXRgr(t)$ = Exchange Rate of Greece, expressed in Greek currency units (Drachma up until December 31 of 1998 and Euros thereafter) per US Dollar in period (t).

$EXRpor(t)$ = Exchange Rate of Portugal, expressed in Portuguese currency units (Escudos up until December 31 of 2000 and Euros thereafter) per US Dollar.

$U(t)$ = Error term.

We have expressed all variables in a logarithmic form. Therefore, the mathematical formulation applied to equations (1) is the double logarithmic and the method of estimation is the OLS.

3. Sources of Data

British tourist arrivals in Cyprus: *Statistical Service of Cyprus* (CYSTAT).

Cyprus revenues from Tourism: *Cyprus Tourism Organization*, Annual Statistical Reports of Tourism Revenue.

Real per capita GDP: Estimated based on GDP, CPI and population data from *International Financial Statistics (IMF) – Yearbook, 2000, 2004, 2013, 2017 (IMF)*.

Consumer Price Index: Same as above.

Real Exchange Rate: Same as above.

4. Empirical Results

4.1 Ordinary Least Squares (OLS)

We explored variations of the regression equation (1) by using the EViews 10 software the statistical results of which we have posted on the Appendix. In Table 3, we present the results of the most relevant variables presented in Equation (2) below.

$$LARuk(t) = \beta 0 + \beta 1 LYuk(t) + \beta 2 LPgr(t) + \beta 3 LPspn(t) + \beta 4 LPpor(t) + U(t) \tag{2}$$

All variables are in logarithmic form during the period t (1980-2016) where,

$LARuk(t)$ = Logarithm of British arrivals to Cyprus

$LYuk(t)$ = Logarithm of real per capita income of British travelers expressed in 2010 British Pounds

$LPgr(t)$ = Logarithm of relative prices of Cyprus and Greece

$LPspn(t)$ = Logarithm of relative prices of Cyprus and Spain

$LPpor(t)$ = Logarithm of relative prices of Cyprus and Portugal

We based the selection of these variables on the values of the Adjusted R-squared, and the (t) statistics. The high values of the Adjusted R-square and t-statistics in Table 3 are good indications of the relevance of the selected variables and the reliability of the model.

The income elasticity coefficient $\beta 1$ = 1.39 of variable $LYuk(t)$ in Table 3 classifies British travel to Cyprus as income elastic. The above indicates the importance of the economic conditions in UK as a determining factor for Britons to travel to Cyprus.

The negative coefficients $\beta 2$ = -0.37 and $\beta 4$ = -0.75 of the variables $LPgr(t)$ and $LPpor(t)$ indicate the competitive relationship of the tourist industry of Cyprus with those of Greece and Portugal. The cost of visiting either Cyprus or Greece or Portugal, will influence to a certain extent the decision of Britons to visit or not Cyprus. Finally, the positive coefficients $\beta 3$ = 1.77 of the variable $LPspn$ suggests a complementary relationship between tourism in Portugal and Spain. For example, British travelers may be visiting the two neighboring countries of Portugal and Spain concurrently, as a package, irrespective of the prices in Spain. For example, if traveling to Spain is more expensive than Cyprus, the British travelers may still prefer to visit Spain, as long as prices in Portugal are more economical than Cyprus.

Table 3 OLS Results of Equation (2)

$$LARuk(t) = \beta 0 + \beta 1 LYuk(t) + \beta 2 LPgr(t) + \beta 3 LPspn(t) + \beta 4 LPpor(t) + U(t)$$

Variable	Coefficient	t-Statistic	Prob.
$LYuk(t)$	$\beta 1$ = 1.39	349.48	0.000
$LPgr(t)$	$\beta 2$ = -0.37	-3.87	0.001
$LPspn(t)$	$\beta 3$ = 1.77	3.89	0.001
$LPpor(t)$	$\beta 4$ = -0.75	-3.92	0.000
R-squared: 0.950 Adjusted R-squared: 0.946 Durbin-Watson stat: 0.557			

4.2 Unit Root Tests:

In time series analyses, in order to test the validity of the OLS results we assume that the variables are stationary. Further, regression analyses with high R square coefficients are usually suspect of existing trends among the time-series variables that render the OLS estimates unreliable. In order to test the validity of these estimates against the possibility of non-stationarity, we performed the Unit Root Test among all variables by using the Augmented Dickey-Fuller (ADF) test in Table 4.

Although non-stationary variables are not appropriate for OLS analysis, we can transform these variables into stationary by considering their fist-difference.

All variables indicated in Table 4 were stationary based on the ADF statistic at the 5% level with the exception of the per capita income variable, $LYuk(t)$. For that reason, we obtained additional regressions estimates of the first difference of the variables.

Table 4 Testing the Stationarity of the Variable

Unit-Root Tests (in level form)				
Null Hypothesis: The variables have a unit root (they are non-stationary)				
Variables	(ADF) Augmented Dickey-Fuller test statistic	t- test critical values		
		1% level	5% level	10% level
$LARuk(t)$	-3.3306	-3.6268	-2.9458	-2.6115
$LYuk(t)$	-1.8397	-3.6329	-2.9484	-2.6129
$LPgr(t)$	-9.9083	-3.6268	-2.9458	-2.6115
$LPspn(t)$	-3.6571	-3.6329	-2.9484	-2.6129
$LPpor(t)$	-8.9874	-3.6268	-2.9458	-2.6115

4.3 First-Difference

Equation (3) below is the transformation of Equation (2) in its first-difference format and in Table 5 we present its OLS estimates.

$$\Delta LARuk(t) = \beta'0 + \beta1'\Delta LYuk(t) + \beta2'\Delta LPgr(t) + \beta3\Delta \mathrm{LPspn(t)} + \beta4'\Delta LPpor(t) + U'(t) \quad (3)$$

The OLS regression results of the first differenced variables in Table 5 show lower values for the Adjusted R-squared and the t-statistics as compared with the results of Table 3. The above findings represent, of course, estimates with lower levels of confidence regarding their accuracy. Nevertheless, the correct signs confirm our initial findings that it is the income of Britons and competitive pricing from Portugal and Greece that primarily influence their decisions to travel to Cyprus. Furthermore, the positive coefficients $\beta'3$ = 1.32 for Spain suggests a complementary relationship between tourism in Portugal and Spain.

Table 5 OLS Results of the First Difference Equation (3)

$$\Delta LARuk(t) = \beta'0 + \beta1'\Delta LYuk(t) + \beta2'\Delta LPgr(t) + \beta3\Delta \mathrm{LPspn(t)} + \beta4'\Delta LPpor(t) + U'(t)$$

Variable	Coefficient	t-Statistic	Prob.
$\Delta LYuk(t)$	$\beta1'$ = 1.49	1.59	0.121
$\Delta LPgr(t)$	$\beta2'$ = -0.06	-0.13	0.894
$\Delta LPspn(t)$	$\beta3'$ = 1.32	1.85	0.074
$\Delta LPpor(t)$	$\beta4'$ = -0.91	-2.94	0.006
R-squared: 0.222 Adjusted R-squared: 0.147 Durbin-Watson stat: 2.035			

4.4 Cointegration and the VECM Tests

We have explored the possibility of cointegration of the variables, regarding the extent to which they are converging to an equilibrium position in the long-run, by using the Johansen Test of Cointegration and the (VECM) Vector Error Correction Model.

The results of the Johansen Test posted on the Appendix indicate that there are at least two cointegrated relations among the five variables of our model of Equation (2). As a result, we can apply the Vector Error Correction Model (VECM) to explore the nature of these relationships.

Our statistical tests listed indicate that our variable converge in the long-run. The speed of adjustment towards the long-run equilibrium coefficient C(1) = -0.055 has the correct sign but a relative low level of significance indicating a 35.5% probability of error. The negative sign indicates that every time there is a movement away for the equilibrium position in one direction, there is a movement in the opposite direction bringing the relationship towards its equilibrium position. The value 0.055 indicates that 5.5% of the departures away of the equilibrium are corrected in each period. Furthermore, there is a strong causality in the short run as well between the arrivals of Briton to Cyprus and their incomes, as well as the relative prices in Cyprus in comparison to the prices in Greece, Spain and Portugal.

4.5 Additional Tests

The R-squared of the Vector Error Correction Model (VECM) was 0.638208, i.e., larger than 60% indicating a good fit of the data. Additional tests showed no evidence of autocorrelation and heteroscedasticity. Finally, a Stability Diagnostic Test showed that the model is dynamically stable during the time under consideration.

5. Conclusions

5.1 Real Per Capita Income Variable, $Yuk(t)$

The income elasticity coefficient ($\beta 1$=1.4 and $\beta 1'$=1.5) in Tables 3 and 5, in the TABLES section, is greater than 1 that classifies British travel to Cyprus as a "luxury" travel activity. It is also highly significant (t = 349.48) in the OLS Equation (2) of Table 3 but less significant (t' = 1.59) in the First Difference Equation (3) of Table 5. The above indicates the strong dependence of tourism of Cyprus to the economic conditions of UK. For example, a 2% increase in the UK GDP would approximately result in a 3% increase in British travel to Cyprus. Of course, the opposite will occur in an anticipated decrease of the UK GDP.

5.2 The Relative Price Variables, LPj

The relative price variables provide an understanding of the economic relationship that the tourism of Cyprus has with other similar tourist destinations in the region. According to estimates of the Cyprus Tourism Organization (CTO) based in London, U.K., the major competitors of Cyprus are Portugal, the island of Crete (Greece), the island of Majorca (Spain), and Sovento (Italy). As a result, we ran several regression equations with the inclusion of the relative prices of countries considered potential tourist rivals to Cyprus to explore the hypothesis of the competitiveness of these countries with Cyprus. The countries we included in our model were Greece, Turkey, Italy, Spain and Portugal due to the availability of statistical data. In the final formulation of our model, however, we decided to include only the countries of Greece, Portugal and Spain based on the significance of the statistical estimates we obtained. The price coefficients with negative signs for Portugal ($\beta 4'$ = -.91 and $\beta 4$ = -.75) and Greece ($\beta 2'$ = -.06 and $\beta 2$ = -.37) are indications of the competition Cyprus encounters from Greece and Portugal for British tourists. Based on the values of these price coefficients and their level of significance, Portugal appears as a much stronger competitor than Greece for British travelers. Finally, the price coefficient with a positive sign for Spain ($\beta 3'$ = 1.32 and $\beta 3$ = 1.77) are indications of the complementary relation between Portugal and Spain with respect to British travel to these two countries as opposed to Cyprus. A possible explanation of this complementary relationship is the close proximity of Portugal and Spain that can facilitate synchronized or package tours between these neighboring countries. For example, if traveling to Spain is more expensive than Cyprus; British travelers may still prefer to visit Spain, as long as prices in Portugal are more economical than Cyprus.

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Appendix

A) Table 3

Dependent Variable: LARVUK				
Method: Least Squares				
Date: 07/05/18 Time: 12:43				
Sample: 1980 2016				
Included observations: 37				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LYUK	1.387246	0.003969	349.4833	0.0000
LPGR	-0.370653	0.095813	-3.868503	0.0005
LPSPN	1.770001	0.454666	3.892971	0.0005
LPPOR	-0.754435	0.192271	-3.923814	0.0004
R-squared	0.950425	Mean dependent var		13.44962
Adjusted R-squared	0.945919	S.D. dependent var		0.767736
S. E. of regression	0.178540	Akaike info criterion		-0.506203
Sum squared resid	1.051925	Schwarz criterion		-0.332049
Log likelihood	13.36475	Hannan-Quinn criter.		-0.444805
Durbin-Watson stat	0.557188			

B) Unit-root tests: (Table 4)

Null Hypothesis: LARVUK has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.330576	0.0207
Test critical values:	1% level		-3.626784	
	5% level		-2.945842	
	10% level		-2.611531	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LARVUK)				
Method: Least Squares				
Date: 07/04/18 Time: 10:21				
Sample (adjusted): 1981 2016				
Included observations: 36 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

LARVUK(-1)	-0.093330	0.028022	-3.330576	0.0021
C	1.318966	0.377094	3.497714	0.0013
R-squared	0.245998	Mean dependent var		0.065046
Adjusted R-squared	0.223822	S.D. dependent var		0.145580
S.E. of regression	0.128257	Akaike info criterion		-1.215603
Sum squared resid	0.559298	Schwarz criterion		-1.127630
Log likelihood	23.88086	Hannan-Quinn criter.		-1.184898
F-statistic	11.09274	Durbin-Watson stat		1.790999
Prob (F-statistic)	0.002096			

Null Hypothesis: LYUK has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag = 9)				
B				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.839668	0.3559
Test critical values:	1% level		-3.632900	
	5% level		-2.948404	
	10% level		-2.612874	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LYUK)				
Method: Least Squares				
Date: 07/04/18 Time: 10:32				
Sample (adjusted): 1982 2016				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LYUK(-1)	-0.029602	0.016091	-1.839668	0.0751
D(LYUK(-1))	0.501968	0.136120	3.687701	0.0008
C	0.303134	0.159832	1.896575	0.0669
R-squared	0.373595	Mean dependent var		0.018201
Adjusted R-squared	0.334445	S.D. dependent var		0.022832
S.E. of regression	0.018626	Akaike info criterion		-5.046661
Sum squared resid	0.011102	Schwarz criterion		-4.913345
Log likelihood	91.31656	Hannan-Quinn criter.		-5.000640
F-statistic	9.542589	Durbin-Watson stat		1.793350

Prob (F-statistic)	0.000562			

Null Hypothesis: D (LYUK) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.329554	0.0210
Test critical values:	1% level		-3.632900	
	5% level		-2.948404	
	10% level		-2.612874	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LYUK,2)				
Method: Least Squares				
Date: 07/04/18 Time: 10:42				
Sample (adjusted): 1982 2016				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D (LYUK(-1))	-0.465272	0.139740	-3.329554	0.0021
C	0.009183	0.004023	2.282574	0.0290
R-squared	0.251462	Mean dependent var		0.001335
Adjusted R-squared	0.228779	S.D. dependent var		0.021963
S.E. of regression	0.019288	Akaike info criterion		-5.003269
Sum squared resid	0.012276	Schwarz criterion		-4.914392
Log likelihood	89.55721	Hannan-Quinn criter.		-4.972589
F-statistic	11.08593	Durbin-Watson stat		1.726294
Prob (F-statistic)	0.002149			

Null Hypothesis: LPGR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-9.908276	0.0000
Test critical values:	1% level		-3.626784	
	5% level		-2.945842	

	10% level		-2.611531	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LPGR)				
Method: Least Squares				
Date: 07/04/18 Time: 10:34				
Sample (adjusted): 1981 2016				
Included observations: 36 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPGR(-1)	-0.088408	0.008923	-9.908276	0.0000
C	-0.026066	0.011698	-2.228239	0.0326
R-squared	0.742763	Mean dependent var		-0.094712
Adjusted R-squared	0.735197	S.D. dependent var		0.109900
S.E. of regression	0.056553	Akaike info criterion		-2.853311
Sum squared resid	0.108742	Schwarz criterion		-2.765338
Log likelihood	53.35960	Hannan-Quinn criter.		-2.822606
F-statistic	98.17394	Durbin-Watson stat		0.906492
Prob(F-statistic)	0.000000			

Null Hypothesis: LPSPN has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag = 9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.657138	0.0094
Test critical values:	1% level		-3.632900	
	5% level		-2.948404	
	10% level		-2.612874	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LPSPN)				
Method: Least Squares				
Date: 07/04/18 Time: 10:37				
Sample (adjusted): 1982 2016				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

LPSPN(-1)	-0.159596	0.043640	-3.657138	0.0009
D(LPSPN(-1))	0.285640	0.136548	2.091868	0.0445
C	0.002485	0.007144	0.347904	0.7302
R-squared	0.530134	Mean dependent var		-0.020369
Adjusted R-squared	0.500768	S.D. dependent var		0.050442
S.E. of regression	0.035641	Akaike info criterion		-3.748837
Sum squared resid	0.040648	Schwarz criterion		-3.615521
Log likelihood	68.60464	Hannan-Quinn criter.		-3.702816
F-statistic	18.05227	Durbin-Watson stat		2.085991
Prob(F-statistic)	0.000006			

Null Hypothesis: LPPOR has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag = 9)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-8.987367	0.0000
Test critical values:	1% level		-3.626784	
	5% level		-2.945842	
	10% level		-2.611531	
*MacKinnon (1996) one-sided p-values.				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(LPPOR)				
Method: Least Squares				
Date: 07/04/18 Time: 10:39				
Sample (adjusted): 1981 2016				
Included observations: 36 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPPOR(-1)	-0.151119	0.016815	-8.987367	0.0000
C	-0.014614	0.010954	-1.334139	0.1910
R-squared	0.703762	Mean dependent var		-0.060389
Adjusted R-squared	0.695050	S.D. dependent var		0.105370
S.E. of regression	0.058188	Akaike info criterion		-2.796328

Sum squared resid	0.115118	Schwarz criterion		-2.708355
Log likelihood	52.33390	Hannan-Quinn criter.		-2.765623
F-statistic	80.77277	Durbin-Watson stat		0.912931
Prob(F-statistic)	0.000000			

C) Table 5

Dependent Variable: DLARVUK				
Method: Least Squares				
Date: 07/04/18 Time: 11:11				
Sample (adjusted): 1982 2016				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLYUK	1.491926	0.936146	1.593689	0.1212
DLPGR	-0.062626	0.466401	-0.134275	0.8941
DLPSPN	1.324220	0.716713	1.847631	0.0742
DLPPOR	-0.908884	0.309199	-2.939483	0.0062
bR-squared	0.222162	Mean dependent var		0.062692
Adjusted R-squared	0.146887	S.D. dependent var		0.147008
S.E. of regression	0.135783	Akaike info criterion		-1.048308
Sum squared resid	0.571547	Schwarz criterion		-0.870554
Log likelihood	22.34540	Hannan-Quinn criter.		-0.986948
Durbin-Watson stat	2.035515			

D) Cointegration Results

Date: 07/06/18 Time: 13:46					
Sample (adjusted): 1982 2016					
Included observations: 35 after adjustments					
Trend assumption: Linear deterministic trend					
Series: LARVUK LYUK LPGR LPSPN LPPOR					
Lags interval (in first differences): 1 to 1					
Unrestricted Cointegration Rank Test (Trace)					
Hypothesized		Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.842334	142.1687	69.81889	0.0000	
At most 1 *	0.708236	77.51395	47.85613	0.0000	
At most 2 *	0.394507	34.40062	29.79707	0.0138	
At most 3 *	0.258823	16.84072	15.49471	0.0312	
At most 4 *	0.166105	6.357656	3.841465	0.0117	

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level					
* denotes rejection of the hypothesis at the 0.05 level					
**MacKinnon-Haug-Michelis (1999) p-values					
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)					
Hypothesized		Max-Eigen	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.842334	64.65476	33.87687	0.0000	
At most 1 *	0.708236	43.11333	27.58434	0.0002	
At most 2	0.394507	17.55990	21.13162	0.1472	
At most 3	0.258823	10.48306	14.26460	0.1821	
At most 4 *	0.166105	6.357656	3.841465	0.0117	
Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level					
* denotes rejection of the hypothesis at the 0.05 level					
**MacKinnon-Haug-Michelis (1999) p-values					
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b = I):					
LARVUK	LYUK	LPGR	LPSPN	LPPOR	
-1.693992	-0.214769	0.266793	6.964224	-0.989123	
1.782865	-3.873878	14.52707	-14.33130	-15.73958	
1.404347	0.210265	1.332196	-22.57426	7.489205	
-5.020449	14.69614	1.223671	11.11407	-8.408436	
4.563843	10.15268	4.085648	5.358364	-0.392586	
Unrestricted Adjustment Coefficients (alpha):					
D(LARVUK)	0.034214	-0.035796	-0.031403	0.034369	-0.024114
D(LYUK)	0.001710	-0.001832	0.001865	-0.006460	-0.005004
D(LPGR)	-0.020856	-0.016031	0.016423	0.006261	-0.002039
D(LPSPN)	-0.021524	0.009567	0.008751	0.011882	-0.002380
D(LPPOR)	-0.041070	0.005096	-0.004167	0.004022	-0.003419
1 Cointegrating Equation(s):		Log likelihood	357.3935		
Normalized cointegrating coefficients (standard error in parentheses)					
LARVUK	LYUK	LPGR	LPSPN	LPPOR	
1.000000	0.126783	-0.157494	-4.111131	0.583900	
	(0.85410)	(0.68553)	(1.30340)	(0.92148)	
Adjustment coefficients (standard error in parentheses)					
D(LARVUK)	-0.057958				

	(0.03592)				
D(LYUK)	-0.002897				
	(0.00578)				
D(LPGR)	0.035330				
	(0.01156)				
D(LPSPN)	0.036461				
	(0.01007)				
D(LPPOR)	0.069572				
	(0.00736)				
2 Cointegrating Equation(s):		Log likelihood	378.9502		
Normalized cointegrating coefficients (standard error in parentheses)					
LARVUK	LYUK	LPGR	LPSPN	LPPOR	
1.000000	0.000000	0.300414	-4.327647	0.064989	
		(0.64581)	(1.11692)	(0.86419)	
0.000000	1.000000	-3.611747	1.707768	4.092912	
		(0.51195)	(0.88541)	(0.68507)	
Adjustment coefficients (standard error in parentheses)					
D (LARVUK)	-0.121778	0.131322			
	(0.04943)	(0.07798)			
D (LYUK)	-0.006164	0.006731			
	(0.00835)	(0.01317)			
D (LPGR)	0.006749	0.066580			
	(0.01504)	(0.02373)			
D (LPSPN)	0.053518	-0.032440			
	(0.01393)	(0.02197)			
D (LPPOR)	0.078657	-0.010921			
	(0.01043)	(0.01645)			
3 Cointegrating Equation(s):		Log likelihood	387.7301		
Normalized cointegrating coefficients (standard error in parentheses)					
LARVUK	LYUK	LPGR	LPSPN	LPPOR	
1.000000	0.000000	0.000000	-1.294991	-1.111193	
			(1.58681)	(0.53981)	
0.000000	1.000000	0.000000	-34.75253	18.23363	
			(11.5702)	(3.93605)	
0.000000	0.000000	1.000000	-10.09492	3.915202	
			(3.23279)	(1.09976)	
Adjustment coefficients (standard error in parentheses)					

D (LARVUK)	-0.165878	0.124720	-0.552722		
	(0.05438)	(0.07461)	(0.28018)		
D (LYUK)	-0.003545	0.007123	-0.023679		
	(0.00956)	(0.01312)	(0.04927)		
D (LPGR)	0.029813	0.070033	-0.216563		
	(0.01493)	(0.02048)	(0.07690)		
D (LPSPN)	0.065807	-0.030600	0.144900		
	(0.01534)	(0.02105)	(0.07903)		
D (LPPOR)	0.072805	-0.011798	0.057524		
	(0.01180)	(0.01619)	(0.06078)		
4 Cointegrating Equation(s):		Log likelihood	392.9717		
Normalized cointegrating coefficients (standard error in parentheses)					
LARVUK	LYUK	LPGR	LPSPN	LPPOR	
1.000000	0.000000	0.000000	0.000000	-1.814875	
				(0.31675)	
0.000000	1.000000	0.000000	0.000000	-0.650457	
				(0.10527)	
0.000000	0.000000	1.000000	0.000000	-1.570251	
				(0.05120)	
0.000000	0.000000	0.000000	1.000000	-0.543388	
				(0.05540)	
Adjustment coefficients (standard error in parentheses)					
D (LARVUK)	-0.338428	0.629817	-0.510665	1.842154	
	(0.10416)	(0.27470)	(0.26459)	(0.53820)	
D (LYUK)	0.028889	-0.087819	-0.031585	-0.075722	
	(0.01815)	(0.04786)	(0.04610)	(0.09376)	
D (LPGR)	-0.001619	0.162043	-0.208902	-0.216660	
	(0.02960)	(0.07807)	(0.07520)	(0.15296)	
D (LPSPN)	0.006156	0.144013	0.159439	-0.352497	
	(0.02841)	(0.07493)	(0.07217)	(0.14680)	
D (LPPOR)	0.052612	0.047312	0.062445	-0.220277	
	(0.02361)	(0.06226)	(0.05997)	(0.12199)	

E) Vector Error Correction Model (VECM)

The results of two cointegrated equations of the VECM are listed below with the cointegrated equations listed first followed by the vector correction coefficients and their corresponding t values. In order to test the Null Hypothesis, we need to generate the System Equation Model.

Vector Error Correction Estimates			
Date: 07/06/18 Time: 19:05			
Sample (adjusted): 1983 2016			
Included observations: 34 after adjustments			

Standard errors in ( ) & t-statistics in [ ]					
Cointegrating Eq:	CointEq1	CointEq2			
LARVUK(-1)	1.000000	0.000000			
LYUK(-1)	0.000000	1.000000			
LPGR(-1)	1.805837	-1.799710			
	(0.92689)	(0.39314)			
	[1.94828]	[-4.57773]			
LPSPN(-1)	-4.106629	-0.816568			
	(1.24306)	(0.52725)			
	[-3.30366]	[-1.54873]			
LPPOR(-1)	-3.239641	2.441390			
	(1.18651)	(0.50327)			
	[-2.73039]	[4.85108]			
C	-13.67236	-9.213206			
Error Correction:	D (LARVUK)	D (LYUK)	D (LPGR)	D (LPSPN)	D (LPPOR)
CointEq1	-0.054546	-0.006981	0.014191	0.038881	0.066601
	(0.05763)	(0.01072)	(0.01364)	(0.01428)	(0.01024)
	[-0.94643]	[-0.65091]	[1.04003]	[2.72336]	[6.50505]
CointEq2	0.226752	0.024024	0.216192	0.069155	0.031698
	(0.16538)	(0.03077)	(0.03915)	(0.04097)	(0.02938)
	[1.37111]	[0.78068]	[5.52161]	[1.68804]	[1.07894]
D(LARVUK(-1))	-0.076449	-0.004451	-0.036956	-0.080973	-0.126202
	(0.16540)	(0.03078)	(0.03916)	(0.04097)	(0.02938)
	[-0.46220]	[-0.14461]	[-0.94372]	[-1.97621]	[-4.29496]
D(LARVUK(-2))	-0.091587	0.033206	-0.056672	-0.081861	-0.009037
	(0.19951)	(0.03712)	(0.04723)	(0.04942)	(0.03544)
	[-0.45906]	[0.89444]	[-1.19981]	[-1.65635]	[-0.25497]
D(LYUK(-1))	3.110337	0.637287	0.740247	0.027826	-0.164502
	(1.21302)	(0.22572)	(0.28719)	(0.30049)	(0.21549)
	[2.56413]	[2.82338]	[2.57759]	[0.09260]	[-0.76338]

D(LYUK(-2))	-0.054194	-0.106350	0.234570	0.614936	-0.055106
	(1.49698)	(0.27856)	(0.35441)	(0.37083)	(0.26594)
	[-0.03620]	[-0.38179]	[0.66185]	[1.65826]	[-0.20722]
D(LPGR(-1))	-0.935555	-0.074007	-0.663946	-0.308422	-0.364804
	(0.77142)	(0.14355)	(0.18264)	(0.19110)	(0.13704)
	[-1.21276]	[-0.51556]	[-3.63534]	[-1.61396]	[-2.66198]
D(LPGR(-2))	-1.035479	-0.112762	-0.420083	-0.256018	-0.017688
	(0.79766)	(0.14843)	(0.18885)	(0.19759)	(0.14170)
	[-1.29815]	[-0.75971]	[-2.22447]	[-1.29567]	[-0.12482]
D(LPSPN(-1))	2.471052	0.090893	0.999964	0.585846	0.359583
	(1.17408)	(0.21847)	(0.27797)	(0.29084)	(0.20857)
	[2.10467]	[0.41604]	[3.59744]	[2.01431]	[1.72401]
D(LPSPN(-2))	2.367451	-0.095716	0.073256	0.555524	0.054074
	(0.98908)	(0.18405)	(0.23417)	(0.24501)	(0.17571)
	[2.39360]	[-0.52006]	[0.31284]	[2.26732]	[0.30775]
D(LPPOR(-1))	-2.667885	-0.006011	-0.869043	-0.654064	0.197150
	(1.18003)	(0.21958)	(0.27938)	(0.29232)	(0.20963)
	[-2.26086]	[-0.02737]	[-3.11067]	[-2.23752]	[0.94046]
D(LPPOR(-2))	0.541944	-0.002629	0.452955	8.40E-05	0.029551
	(0.78107)	(0.14534)	(0.18492)	(0.19349)	(0.13876)
	[0.69385]	[-0.01809]	[2.44947]	[0.00043]	[0.21297]
C	-0.192351	-0.012093	-0.206086	-0.086706	-0.054044
	(0.13996)	(0.02604)	(0.03313)	(0.03467)	(0.02486)
	[-1.37436]	[-0.46433]	[-6.21959]	[-2.50089]	[-2.17368]
R-squared	0.638208	0.477758	0.962811	0.785322	0.975086
Adj. R-squared	0.431469	0.179335	0.941561	0.662649	0.960850
Sum sq. resids	0.265702	0.009200	0.014893	0.016305	0.008385
S.E. equation	0.112483	0.020931	0.026631	0.027864	0.019982
F-statistic	3.087030	1.600940	45.30738	6.401743	68.49283
Log likelihood	34.23571	91.40948	83.22090	81.68129	92.98595
Akaike AIC	-1.249159	-4.612323	-4.130641	-4.040076	-4.705056
Schwarz SC	-0.665551	-4.028714	-3.547033	-3.456467	-4.121448
Mean dependent	0.063261	0.018501	-0.088686	-0.017390	-0.052446
S.D. dependent	0.149180	0.023105	0.110161	0.047974	0.100991

Determinant resid covariance (dof adj.)	2.43E-16			
Determinant resid covariance	2.18E-17			
Log likelihood	410.9600			
Akaike information criterion	-19.76235			
Schwarz criterion	-16.39538			

F) We Obtain the System Equation Model:

In the System Equation Model below, we have 60 coefficients, e.g., 12 coefficients for each variable (12×5 = 60). For example, for the dependent variable D(LARVUK) we have coefficients C(1)-C(12) and for the remaining four independent variables D(LYUK), D(LPGR), D(LPSPN), and D(LPPOR) the coefficients C(13)-(C(60).

D(LARVUK) = C(1)*(LARVUK(-1) + 1.80583693654*LPGR(-1) - 4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) - 13.672362129) + C(2)*(LYUK(-1) - 1.79971026348*LPGR(-1) - 0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) - 9.21320624077) + C(3)*D(LARVUK(-1)) + C(4)*D(LARVUK(-2)) + C(5)*D(LYUK(-1)) + C(6)*D(LYUK(-2)) + C(7)*D(LPGR(-1)) + C(8)*D(LPGR(-2)) + C(9)*D(LPSPN(-1)) + C(10)*D(LPSPN(-2)) + C(11)*D(LPPOR(-1)) + C(12)*D(LPPOR(-2)) + C(13)

D(LYUK) = C(14)*(LARVUK(-1) + 1.80583693654*LPGR(-1) - 4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) - 13.672362129) + C(15)*(LYUK(-1) - 1.79971026348*LPGR(-1) - 0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) - 9.21320624077) + C(16)*D(LARVUK(-1)) + C(17)*D(LARVUK(-2)) + C(18)*D(LYUK(-1)) + C(19)*D(LYUK(-2)) + C(20)*D(LPGR(-1)) + C(21)*D(LPGR(-2)) + C(22)*D(LPSPN(-1)) + C(23)*D(LPSPN(-2)) + C(24)*D(LPPOR(-1)) + C(25)*D(LPPOR(-2)) + C(26)

D(LPGR) = C(27)*(LARVUK(-1) + 1.80583693654*LPGR(-1) - 4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) - 13.672362129) + C(28)*(LYUK(-1) - 1.79971026348*LPGR(-1) - 0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) - 9.21320624077) + C(29)*D(LARVUK(-1)) + C(30)*D(LARVUK(-2)) + C(31)*D(LYUK(-1)) + C(32)*D(LYUK(-2)) + C(33)*D(LPGR(-1)) + C(34)*D(LPGR(-2)) + C(35)*D(LPSPN(-1)) + C(36)*D(LPSPN(-2)) + C(37)*D(LPPOR(-1)) + C(38)*D(LPPOR(-2)) + C(39)

D(LPSPN) = C(40)*(LARVUK(-1) + 1.80583693654*LPGR(-1) - 4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) - 13.672362129) + C(41)*(LYUK(-1) - 1.79971026348*LPGR(-1) - 0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) - 9.21320624077) + C(42)*D(LARVUK(-1)) + C(43)*D(LARVUK(-2)) + C(44)*D(LYUK(-1)) + C(45)*D(LYUK(-2)) + C(46)*D(LPGR(-1)) + C(47)*D(LPGR(-2)) + C(48)*D(LPSPN(-1)) + C(49)*D(LPSPN(-2)) + C(50)*D(LPPOR(-1)) + C(51)*D(LPPOR(-2)) + C(52)

D(LPPOR) = C(53)*(LARVUK(-1) + 1.80583693654*LPGR(-1) - 4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) - 13.672362129) + C(54)*(LYUK(-1) - 1.79971026348*LPGR(-1) - 0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) - 9.21320624077) + C(55)*D(LARVUK(-1)) + C(56)*D(LARVUK(-2)) + C(57)*D(LYUK(-1)) + C(58)*D(LYUK(-2)) + C(59)*D(LPGR(-1)) + C(60)*D(LPGR(-2)) + C(61)*D(LPSPN(-1)) + C(62)*D(LPSPN(-2)) + C(63)*D(LPPOR(-1)) + C(64)*D(LPPOR(-2)) + C(65)

G) Long Run Causality:
In order to test for a long run causality among the five variable of our model, we apply the OLS regression model to the target model (first equation) where the D(LARVUK) is our dependent variable.

The results below indicate a negative C(1) value C(1) = -0.054546 indicating a <u>long run</u> causality between the independent variable with the dependent one. For example, the negative sign implies that every time a variable moves in one direction, there are forces moving it to the opposite direction, i.e., towards the long run equilibrium. The associated probability .3547 indicates that there is 35.5 percent probability for error which is relative high.

The R-squared = 0.638208 indicate a good fit of the data (larger than 60%) and the F statistic is significant at 5% (Probability of (F-statistic) 0.011538 .

Dependent Variable: D(LARVUK)				
Method: Least Squares				
Date: 07/06/18 Time: 19:10				
Sample (adjusted): 1983 2016				
Included observations: 34 after adjustments				
D(LARVUK) = C(1)*(LARVUK(-1) + 1.80583693654*LPGR(-1) -				
4.10662898358*LPSPN(-1) - 3.23964107782*LPPOR(-1) -				
13.672362129) + C(2)*(LYUK(-1) - 1.79971026348*LPGR(-1) -				
0.816567666666*LPSPN(-1) + 2.44139044289*LPPOR(-1) -				
9.21320624077) + C(3)*D(LARVUK(-1)) + C(4)*D(LARVUK(-2)) +				
C(5)*D(LYUK(-1)) + C(6)*D(LYUK(-2)) + C(7)*D(LPGR(-1)) + C(8)				
*D(LPGR(-2)) + C(9)*D(LPSPN(-1)) + C(10)*D(LPSPN(-2)) +				
C(11)*D(LPPOR(-1)) + C(12)*D(LPPOR(-2)) + C(13)				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.054546	0.057633	-0.946432	0.3547
C(2)	0.226752	0.165378	1.371108	0.1848
C(3)	-0.076449	0.165405	-0.462196	0.6487
C(4)	-0.091587	0.199511	-0.459057	0.6509
C(5)	3.110337	1.213020	2.564127	0.0181
C(6)	-0.054194	1.496984	-0.036202	0.9715
C(7)	-0.935555	0.771424	-1.212764	0.2387
C(8)	-1.035479	0.797656	-1.298153	0.2083
C(9)	2.471052	1.174079	2.104673	0.0475
C(10)	2.367451	0.989076	2.393599	0.0261
C(11)	-2.667885	1.180032	-2.260859	0.0345
C(12)	0.541944	0.781068	0.693850	0.4954
C(13)	-0.192351	0.139956	-1.374363	0.1838
	B			
R-squared	0.638208	Mean dependent var		0.063261
Adjusted R-squared	0.431469	S.D. dependent var		0.149180
S.E. of regression	0.112483	Akaike info criterion		-1.249159
Sum squared resid	0.265702	Schwarz criterion		-0.665551
Log likelihood	34.23571	Hannan-Quinn criter.		-1.050132
F-statistic	3.087030	Durbin-Watson stat		1.985495
Prob(F-statistic)	0.011538			

H) Short run causality:

We want to test whether there is a causality in the short run between the dependent variable D(LARVUK) and each of the independent variables.

a) The income variable D(LYUK):

For that purpose, we test the Null Hypothesis that the coefficients of the income variable C(2), C(5), and C(6) are equal to zero, e.g., the income variable D(LYUK) in not related to the arrivals variable D(LARVUK). However, the results below indicate the opposite since we reject the Null Hypothesis at the 5% level. Therefore, the British arrivals to Cyprus are related to the British incomes in the short run at (95%).

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	3.041671	(3, 21)	0.0515
Chi-square	9.125014	3	0.0277
Null Hypothesis: C(2) = C(5) = C(6) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		0.226752	0.165378
C(5)		3.110337	1.213020
C(6)		-0.054194	1.496984
Restrictions are linear in coefficients.			

b) The D(LPGR) variable:

We reject the Null Hypothesis at 10 percent confidence interval. Therefore, price in Greece affect British travel to Cyprus with 90% confidence.

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	2.492179	(2, 21)	0.1069
Chi-square	4.984358	2	0.0827
Null Hypothesis: C(8) = C(9) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(8)		-1.035479	0.797656
C(9)		2.471052	1.174079
Restrictions are linear in coefficients.			

c) The D(LSPN) variable:

We reject the Null Hypothesis at 1 percent confidence interval. Therefore, price in Spain affect British travel to Cyprus with 99% confidence.

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	5.427876	(2, 21)	0.0126
Chi-square	10.85575	2	0.0044
Null Hypothesis: C(9) = C(10) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(9)		2.471052	1.174079
C(10)		2.367451	0.989076
Restrictions are linear in coefficients.			

d) The D(LPPOR) variable:

We reject the Null Hypothesis at 7.5 percent confidence interval. Therefore, prices in Portugal affect British travel to Cyprus with 92.5% confidence.

Wald Test:			
Equation: Untitled			
Test Statistic	Value	Df	Probability
F-statistic	2.929841	(2, 21)	0.0755
Chi-square	5.859683	2	0.0534
Null Hypothesis: C(11) = C(12) = 0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(11)		-2.667885	1.180032
C(12)		0.541944	0.781068
Restrictions are linear in coefficients.			

I) Autocorrelation Test: - No autocorrelation

There is no Autocorrelation.

We cannot reject The Null Hypothesis of no autocorrelation.
The p value of .25 od Chi-Square is higher than 5%.
Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.831491	Prob. F(2,19)		0.4506
Obs*R-squared	2.736361	Prob. Chi-Square(2)		0.2546
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 07/06/18 Time: 23:54				
Sample: 1983 2016				
Included observations: 34				
Presample missing value lagged residuals set to zero.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.002098	0.058826	0.035669	0.9719
C(2)	-0.108964	0.188063	-0.579401	0.5691
C(3)	0.109669	0.293203	0.374037	0.7125
C(4)	-0.236390	0.279739	-0.845037	0.4086
C(5)	-0.306978	1.245948	-0.246381	0.8080
C(6)	-0.172706	1.557450	-0.110890	0.9129
C(7)	0.312562	0.814594	0.383703	0.7055
C(8)	0.447137	0.918878	0.486612	0.6321
C(9)	-0.158253	1.228303	-0.128838	0.8988
C(10)	-0.252102	1.079965	-0.233436	0.8179
C(11)	0.479373	1.368797	0.350215	0.7300
C(12)	-0.148106	0.809679	-0.182919	0.8568
C(13)	0.103791	0.164383	0.631397	0.5353
RESID(-1)	-0.110588	0.400631	-0.276035	0.7855
RESID(-2)	0.555501	0.430866	1.289266	0.2128
R-squared	0.080481	Mean dependent var		-3.65E-17
Adjusted R-squared	-0.597059	S.D. dependent var		0.089730
S.E. of regression	0.113397	Akaike info criterion		-1.215417
Sum squared resid	0.244318	Schwarz criterion		-0.542023
Log likelihood	35.66209	Hannan-Quinn criter.		-0.985770
F-statistic	0.118784	Durbin-Watson stat		1.908596
Prob(F-statistic)	0.999898			

J) Heteroscedasticity Test: No Heteroscedasticity
The Null Hypothesis is that there is no Heteroscedasticity.
We cannot reject The Null Hypothesis of no Heteroscedasticity.
The p value of Chi-Square.94 is higher than 5%.

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	1.406728	Prob. F(15,18)		0.2430
Obs*R-squared	18.34820	Prob. Chi-Square(15)		0.2448
Scaled explained SS	7.511836	Prob. Chi-Square(15)		0.9419
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/07/18 Time: 00:12				
Sample: 1983 2016				
Included observations: 34				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.244240	0.398273	0.613248	0.5474
LARVUK(-1)	-0.029389	0.021444	-1.370488	0.1874
LPGR(-1)	-0.313678	0.103740	-3.023702	0.0073
LPSPN(-1)	0.350900	0.141240	2.484421	0.0230
LPPOR(-1)	-0.079686	0.113774	-0.700385	0.4926
LYUK(-1)	0.114331	0.135975	0.840824	0.4115
LARVUK(-2)	0.012922	0.023916	0.540301	0.5956
LARVUK(-3)	-0.004221	0.022398	-0.188460	0.8526
LYUK(-2)	0.143660	0.233170	0.616120	0.5455
LYUK(-3)	-0.252712	0.166149	-1.520997	0.1456
LPGR(-2)	0.026138	0.101826	0.256691	0.8003
LPGR(-3)	0.129136	0.082324	1.568636	0.1341
LPSPN(-2)	0.095468	0.156574	0.609733	0.5497
LPSPN(-3)	-0.287433	0.117187	-2.452769	0.0246
LPPOR(-2)	0.075986	0.179954	0.422251	0.6778
LPPOR(-3)	0.156963	0.092748	1.692362	0.1078
R-squared	0.539653	Mean dependent var		0.007815
Adjusted R-squared	0.156030	S.D. dependent var		0.011621
S.E. of regression	0.010676	Akaike info criterion		-5.936433
Sum squared resid	0.002052	Schwarz criterion		-5.218146
Log likelihood	116.9194	Hannan-Quinn criter.		-5.691477
F-statistic	1.406728	Durbin-Watson stat		2.363844

Prob(F-statistic)	0.242957			

K) Stability Diagnostic Test: The model is dynamically stable (see graph below)