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The Tourism-led economic growth Hypothesis in the Euro Area: Do Asymmetries and Structural Breaks Matter?

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Abstract

This paper examines the validity of the tourism-led economic growth hypothesis for the Euro Area economies. We employ linear and nonlinear autoregressive distributed lag cointegration approaches to examine the symmetric and asymmetric effects of tourism on economic growth. Furthermore, we control for the presence of structural breaks in the time series which account for the recent financial and debt crises in the Euro Area. The results support the positive impact of tourism on economic growth for most of the Euro Area economies and are robust to alternative tourism measures. The findings indicate that an asymmetric impact exists both in the long and the short run. Positive and negative shocks of tourism and real exchange rate result to very different effects, in the sign and magnitude, on economic growth.

Keywords: *Tourism-Led Growth Hypothesis; Euro Area; ARDL; Nonlinear ARDL; Structural Breaks*

JEL Classification: *E00, F00, C32, L83, O10, O11, Z32*

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1. INTRODUCTION

In most countries, tourism has been increasingly affecting economic activity (Balaguer and Cantavella-Jordá, 2002; Lee and Chang, 2008). Empirical data from the World Tourism Organization (UNWTO) show that international tourist arrivals in Europe (World) are increasing, reaching $746 ($1466) million in 2019, a 52% (53%) increase compared to 2010. Similarly, the international tourism receipts in Europe (World) are increasing throughout our sample period, reaching $572 ($1,466) billion in 2019, a 33.3% (50.2%) increase compared to 2010.

The question is whether tourism affects the Euro Area (EA) countries' economic growth. Since the early 2000s, the tourism-led economic growth (TLEG) hypothesis has been researched empirically. However, the results based on a significant number of studies examining the verification of the TLEG hypothesis are contradictory. A number of studies verify it; others confront it, while other works conclude that there is a bidirectional relationship between tourism and economic growth. The econometric tools mainly used in the literature are cointegration analysis and causality testing.

This paper contributes to the existing tourism literature in several ways. First, we examine the effects of tourism on economic growth for EA countries using time series analysis, allowing us to perform a comparative analysis of the results. Second, we use the recently established cointegration method proposed by Shin et al. (2014) to examine the asymmetric nexus between tourism and economic growth. The cointegrating asymmetric nonlinear autoregressive distributed lag (NARDL) approach is based on the ARDL approach of Pesaran et al. (2001). In order to capture asymmetries, Shin et al. (2014) decompose the independent variables into positive and negative partial sums. The NARDL model is essentially an extension of the ARDL model through the decomposition of regressors, with the same objective, namely, to capture the long-run equilibrium relationships among the examined variables, however, by allowing for asymmetries.[1] Third, our econometric analysis takes into account the recent financial and sovereign debt crises for the EA, which have led to the presence of structural breaks (SB) in the time series data of EA countries. Structural breaks, as identified by integration testing, are controlled in our framework so as to explore the relationship between tourism and economic growth. Thus, in our analysis, we also apply the NARDL approach with the presence of SBs.

The paper is structured as follows. In the next section, we present the review of the previous empirical literature. We analyze the econometric methodology and data in Section 3 and report findings in Section 4. Finally, Section 5 presents conclusions.

2. LITERATURE REVIEW

There is an extensive number of empirical studies on the relationship between tourism and economic growth. Among the main studies establishing a positive impact of tourism on economic performance are those by Balaguer and Cantavella-Jordá, 2002; Belloumi, 2010; Cortes-Jimenez and Pulina, 2010, which are based on cointegration analysis in time series setting. The TLEG hypothesis has also been confirmed by the works of Lee and Chang, 2008; Proença and Soukiazis, 2008; Akinboade and Braimoh, 2010; Dritsakis, 2012; Chou, 2013, with the use of cointegration and causality analysis in panel data. Finally, the positive impact of tourism on economic growth has also been verified via estimation methods, such as the general method of moments (GMM) that addresses the issue of endogeneity (Konstantakopoulou, 2022). On the other hand, several studies find that the TLEG hypothesis is rejected, using cointegration and causality analysis in times series and panel data (Martins et al., 2017; Perles-Ribes et al., 2017; Croes et al., 2018; Mitra, 2019).

[1] This approach has several positive properties, as *i)* it can be easily applied through a single equation to examine both the long run and short run effects of the independent variables at the same time; *ii)* it can be efficiently used in small samples to define cointegration; *iii)* it permits robust estimation without being affected by different orders of integration of the regressors; and *iv)* the dynamic multipliers permit the detection of the asymmetric dynamic adjustment path following positive or negative disturbances of the exogenous regressors.

The empirical literature has studied the TLEG hypothesis for several EA countries such as Spain, Greece, Italy, Cyprus, Portugal, Malta, France, Latvia, Slovenia, and Slovakia. However, we observe this hypothesis has yet to be investigated in Austria, Belgium, Finland, Germany, Ireland, and the Netherlands; thus, there is no comparative assessment of results within the EA. More specifically, Balaguer and Cantavella-Jorda (2002) found the TLEG hypothesis is valid in Spain, using cointegration and Granger causality analysis. Perles-Ribes et al. (2017) reported a two-way relationship between tourism and economic growth in Spain. They re-have examined the TLEG hypothesis with regard to the Spanish economy, taking into account recent events such as the global financial crisis and the Arab Spring uprisings. They used the ARDL bounds approach and Granger causality analysis for their empirical work. Cortes-Jimenez and Pulina (2010) examined the relationship between inbound tourism expansion and economic growth in Spain and Italy, using cointegration and multivariate Granger causality tests. They concluded in favour of the existence of a bidirectional relationship between tourism expansion and economic growth in the Spanish economy, while, in the case of Italy, they detected a unidirectional Granger causality relationship from tourism expansion to economic growth. Proença and Soukiazis (2008) confirmed the validity of the TLEG hypothesis in the Southern European countries (Greece, Italy, Portugal, and Spain), using panel analysis.

Dritsakis (2012) showed that tourism positively affects GDP in seven Mediterranean countries (Spain, France, Italy, Greece, Turkey, Cyprus, and Tunisia), using similar econometric analysis. Aslan (2014) examined the relationship between tourism development and economic growth in Mediterranean countries using Granger causality analysis in panel data. Although results varied, they confirmed the TLEG hypothesis in Spain, Italy, Tunisia, Cyprus, Croatia, Bulgaria, and Greece. They also reported a bidirectional causality relationship between tourism development and economic growth in the case of Portugal, while no causality relationship between these variables was observed in the case of Malta or Egypt. Chou (2013) found support for the existence of a causality relationship from tourism spending to economic growth in Cyprus, Latvia, and Slovakia; his analysis was based on a panel causality approach, considering possible cross-sectional dependence across countries. Croes et al. (2018) argued that tourism specialization does not directly impact economic growth in Malta.

Our study examines the impact of tourism in increasing GDP for the EA under a time series modeling framework. We investigate the symmetric and asymmetric effects of tourism on economic growth for 16 EA countries. This analysis allows us to make a comparative analysis of the results for the EA economies. Our comparative study aims to fill the gap in the existing literature, while our results are significant for economic policymakers who seek to increase economic growth.

3. METHODOLOGY

3.1 Data

For our empirical analysis, we use annual data of 16 EA countries, such as Austria (AT), Belgium (BE), Cyprus (CY), Finland (FI), France (FR), Germany (DE), Greece (EL), Ireland (IE), Italy (IT), Latvia (LV), Luxembourg (LU), Malta (MT), the Netherlands (NL), Portugal (PT), Slovak Republic (SK), and Spain (ES), over the period 1996-2019.[2] The study uses three measures to proxy tourism:

a) The tourist arrivals-inbound visitors ($tour_1$). Following Martins et al. (2017), we use two types of tourist arrivals: arrivals of non-resident tourists at national borders (TF) and arrivals of non-resident visitors at national borders (VF) both derived from UNWTO.
b) The real per capita international tourism receipts ($tour_2$). Following Lee and Chang (2008), and Dritsakis (2012), we use this measure which consists of international tourism receipts in current US$, deflated using the GDP deflator and divided by mid-year population. The data are based on the World Bank's World Development Indicators (WDI).

[2] The study excludes Estonia, Lithuania, and Slovenia due to limited data availability.

c) The real tourism expenditure in the country ($tour_3$). Following Martins et al. (2017), we additionally use this proxy, is measured in US$ deflated by the Consumer Price Index, CPI (2010:100). The tourism expenditure variable is collected from UNWTO; the CPI variable comes from the WDI dataset.

Real per capita GDP (gdp) is the GDP per capita in constant 2010 US$; we use this variable to capture the market size of a tourist destination country (Lee and Chang 2008; Belloumi, 2010; Konstantakopoulou, 2022). The real exchange rate ($reef$) is the real effective exchange rate index (2010:100) (Balaguer and Cantavella-Jorda, 2002; Akinboade and Braimoh, 2010; Martins et al., 2017). The data on real per capita GDP and real exchange rate are also derived from the WDI dataset.

3.2 Methodology

The empirical analysis is based on the linear and nonlinear ARDL models without and with the presence of SBs. In the empirical methodology, we applied the following steps: First, we examine the stationarity properties of each time series using a) the Augmented Dickey-Fuller (ADF, 1979), the Phillips and Perron (PP, 1988) and the Generalized Least Squares transformed Dickey-Fuller (DF-GLS, Elliot et al. 1996) tests, b) the Clemente, Montañés, and Reyes (CRM, 1998) test, which assumes unit root with the presence of up to two SBs. In the next step, we estimate the ARDL and NARDL models. We analyse the variables' long-term and short-term dynamic relationships through the Error Correction Model (ECM) in the third step. Thereafter, the ARDL and NARDL bounds tests were used to test the cointegration of the variables. This cointegration approach has better properties than traditional cointegration methods. Through the NARDL approach, we initially test the existence of an asymmetric long-run equilibrium relationship of our variables and then we test for the presence of asymmetric short and long-run relationships among the variables. Finally, we examine the diagnostic properties of the ARDL and NARDL models.

Specification

The literature on the TLEG hypothesis is extensively based on linear ARDL models; there is very limited use of non-linear ARDL models (without SBs) to test the symmetric (Gunduz and Hatemi-J, 2005; Tang and Abosedra, 2014; Perles-Ribes et al., 2017) and asymmetric effects (Husein and Kara, 2020) of tourism on economic growth. Based on the existing empirical literature on the tourism-economic growth nexus, we start with the following time series specification (Balaguer and Cantavella-Jorda, 2002; Dritsakis, 2004; Belloumi, 2010) as described in Equation (1):

$$gdp_t = \lambda + \gamma_1 tour_{i,t} + \gamma_2 reef_t + v_t \quad (1)$$

where $tour_i$ for $i = 1,..3$, stands for the alternative measures of tourism, gdp and $reef$ stand for real per capita GDP and real exchange rate, respectively. v_t is the normally distributed error term. The estimates γ_1 and γ_2 capture the long-run effect of tourism and real exchange rate on economic growth. Equation (1) can be specified as ARDL and NARDL models. The expected sign of the tourism variable is positive according to the TLEG hypothesis. The expected sign of the real exchange rate variable is negative, so that an increase in the real exchange rate (appreciation) leads to a drop in the competitiveness of the tourism host country, which leads to a decline in economic activity. Finally, it should be noted that Equation (1) is transformed into Model 1 for the tourist arrivals variable ($tour_1$), Model 2 for the tourism receipts variable ($tour_2$), and Model 3 for the tourism expenditure variable ($tour_3$).

The ARDL Cointegration Testing Approach

Initially, we employ the Bounds testing procedure suggested by Pesaran et al. (2001). The ARDL procedure permits examining the dynamic relations between variables, even with outliers and SBs using dummy variables. We used dummy variables to detrend time series from SBs and ensured the normal distribution of residuals. We selected the SBs taking into account the most important events that have affected the EA countries, as well as the results of the CRM test with SBs. Thus, applying the bounds testing procedure, we estimate dynamic ECMs for all the variables of interest and the dummy variable and, subsequently, test whether the lagged levels of these variables are significant. The conditional ECM of the ARDL model is as follows:

$$\Delta gdp_t = \lambda_0 + \lambda_1 gdp_{t-1} + \lambda_2 tour_{i,t-1} + \lambda_3 reef_{t-1} + \sum_{j=1}^{p} \delta_j \Delta gdp_{t-j} + \sum_{j=0}^{q_1} \varphi_j \Delta tour_{i,t-j} + \sum_{j=0}^{q_2} \theta_j \Delta reef_{t-j} + \sum_{n=1}^{2} b_n D_{nt} + \varepsilon_t \quad (2)$$

where ε_j is a serially independent, homoscedastic and normally distributed error term. Δ is the first difference operator, λ_0 is the deterministic drift component; $\lambda_1, \lambda_2, \lambda_3$ stand for the long-run elasticities of the Equation (2), δ, φ, and θ, stand for the short-run elasticities of the Equation (2), p, q_1, q_2, are the appropriate lag lengths to be selected (Akaike Information Criterion, AIC). D_{nt} denotes the dummy variables. The time points of D_{nt} will be reported in the section 4.2.

The bounds test of the Pesaran et al. (2001) is a joint F-statistic for the significance of the coefficients of the lagged variables at levels in (2), thus, $H_O: \lambda_1 = \lambda_2 = \lambda_3 = 0$ (of non-existence long-run relationship) against the alternative one: $H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq 0$. In other words, the null hypothesis (H_O) is no cointegration between real GDP per capita, tourism, and real exchange rate. Finally, we estimate the short and long run parameters of variables using the following model:

$$\Delta gdp_t = \lambda_0 + \lambda_1 \left(gdp_{t-1} + \gamma_1 tour_{i,t-1} + \gamma_2 reef_{t-1}\right) + \sum_{j=1}^{p} \delta_j \Delta gdp_{t-j} + \sum_{j=0}^{q_1} \varphi_j \Delta tour_{i,t-j} + \sum_{j=0}^{q_2} \theta_j \Delta reef_{t-j} + \sum_{n=1}^{2} b_n D_{nt} + u_t \quad (3)$$

where λ_1 is the speed of adjustment to the long-run equilibrium. The long-run coefficients are obtained as follows: $\gamma_1 = -\lambda_2/\lambda_1$, and $\gamma_2 = -\lambda_3/\lambda_1$, where $\lambda = -\lambda_0/\lambda_1$.

The NARDL Cointegration Testing Approach

The asymmetric NARDL cointegration approach is based on the ARDL approach (Pesaran et al., 2001). The NARDL model allows modification, allowing us to insert dummy breaks in order to capture the SBs, as we do in our paper. To capture the asymmetries, Shin et al. (2014) developed the nonlinear ARDL model in which short- and long-run nonlinearities are decomposed into partial sum processes of positive and negative changes. The NARDL methodology permits us to examine whether the effects of tourism on economic growth would be the same quantitative reducing or increasing tourism. For our framework, we introduce the following asymmetric regression:

$$gdp_t = \lambda + \gamma_1^+ tour_{i,t}^+ + \gamma_1^- tour_{i,t}^- + \gamma_2^+ reef_t^+ + \gamma_2^- reef_t^- + \upsilon_t \qquad (4)$$

where γ_1^+ (γ_2^+) and γ_1^- (γ_2^-) coefficients denote the long-run effect of positive and negative tourism changes (real exchange rate), respectively.

In our work, the asymmetric ECM form of NARDL $(p,\ q_1^p,\ q_1^n, q_2^p, q_2^n)$ can be written as:

$$\Delta gdp_t = \lambda_0 + \lambda_1 gdp_{1-1} + \lambda_2^+ tour_{i,t-1}^+ + \lambda_2^- tour_{i,t-1}^- + \lambda_3^+ reef_{t-1}^+ + \lambda_3^- reef_{t-1}^- + \sum_{j=1}^{p} \delta_j \Delta gdp_{t-j} + \sum_{j=0}^{q_1^p} \varphi_j^+ \Delta tour_{i,t-j}^+ + \sum_{j=0}^{q_1^n} \varphi_j^- \Delta tour_{i,t-j}^- + \sum_{j=0}^{q_2^p} \theta_j^+ \Delta reef_{t-j}^+ + \sum_{j=0}^{q_2^n} \theta_j^+ \Delta reef_{t-j}^- + \sum_{n=1}^{2} b_n D_{nt} + \mu_t \qquad (5)$$

The optimal lags $p,\ q_1^p,\ q_1^n, q_2^p, q_2^n$ of dependent and independent variables are selected using the AIC.

Similarly, we estimate Equation (5) using the OLS estimator. Then, we test for asymmetric cointegration relationships among the levels of the variables. Two statistics are used to test asymmetric cointegration in the NARDL approach. Firstly, we use the F_{PSS} −statistic (Wald test) suggested by Pesaran et al., (2001) which the null hypothesis is $H_0\colon \lambda_1 = \lambda_2^+ = \lambda_2^- = \lambda_3^+ = \lambda_3^- = 0$ (no cointegration) against the alternative hypothesis $H_1\colon \lambda_1 \neq \lambda_2^+ \neq \lambda_2^- \neq \lambda_3^+ \neq \lambda_3^- \neq 0$. Secondly, we use the t_{BDM} statistic suggested by Banerjee, Dolado, and Mestre (1998) with the null hypothesis is $H_0\colon \lambda_1 = 0$ (no cointegration) against the alternative of that $H_1\colon \lambda_1 < 0$

of cointegration. Rejecting the null hypothesis implies that there is a long run asymmetric relationship (asymmetric cointegration) between the dependent and explanatory variables.

The long-run coefficients in Equation (5) can be estimated as follows:

$$\lambda = -\lambda_0/\lambda_1, \quad \gamma_1^+ = -{\lambda_2^+}/{\lambda_1}, \quad \gamma_1^- = -{\lambda_2^-}/{\lambda_1}, \quad \gamma_2^+ = -{\lambda_3^+}/{\lambda_1}, \quad \gamma_2^- = -{\lambda_3^-}/{\lambda_1}.$$

In the next step, we test for long run asymmetry effects of tourism and real exchange rate on GDP via the Wald tests. The long run symmetric effects of the rise and fall of tourism on GPD is examined by testing the null hypothesis of H_0: ${\lambda_2^+}/{\lambda_1} = {\lambda_2^-}/{\lambda_1}$. Rejecting the null hypothesis implies that there is no long run symmetry in the nexus between tourism and GDP. Similarly, the long run asymmetric effects of real exchange rate GPD is examined by testing the null hypothesis of H_0: ${\lambda_3^+}/{\lambda_1} = {\lambda_3^-}/{\lambda_1}$. Again, the short run symmetry effects of tourism on GDP are tested by the null hypothesis H_0: $\varphi_j^+ = \varphi_j^-$ or $\sum_{j=0}^{q_1^p} \varphi_j^+ = \sum_{j=0}^{q_1^n} \varphi_j^-$ and the alternative hypothesis of H_1: $\varphi_j^+ \neq \varphi_j^-$ or $\sum_{j=0}^{q_1^p} \varphi_j^+ \neq \sum_{j=0}^{q_1^n} \varphi_j^-$. Rejecting the null hypothesis implies that there is a short run asymmetry, i.e., the response of GDP to the positive and negative changes in tourism is asymmetric. Similarly, the short run asymmetry effects of real exchange rate on GDP is testing by the null hypothesis H_0: $\theta_j^+ = \theta_j^-$ or $\sum_{j=0}^{q_1^p} \theta_j^+ = \sum_{j=0}^{q_1^n} \theta_j^-$ and the alternative hypothesis of H_1: $\theta_j^+ \neq \theta_j^-$ or $\sum_{j=0}^{q_1^p} \theta_j^+ \neq \sum_{j=0}^{q_1^n} \theta_j^-$.

4. Empirical results

4.1 Unit Root Tests without SBs

First, we examine the integration order of the series. We use individual unit root tests without SBs, such as the ADF, PP, and DF-GLS tests. The null hypothesis of these tests is non-stationarity. We include an intercept and a linear trend in our time series as they are strongly trended. **Table A.3** in Appendix displays the results of the unit root tests in the first differences and we observe stationarity in most time series. However, we also observe non-stationarity in the GDP variable for CY, FR, EL, IE, IT, the NL, PT, and ES. The real exchange rate variable is non-stationary in the case of EL, as is the tourist arrivals variable in the cases of CY, IE, and LV. The real tourism expenditure variable is non-stationary in the first differences in IE.

4.2 Unit Root Tests with SBs

The traditional ADF, PP, and DF-GLS tests may find that the time series is non-stationary, while the series is a stationary process around breakpoints. These conventional unit root tests overlook the presence of structural changes in time series. Our data sampling includes the 2008 financial crises and the ensuing economic recession experienced by many EA economies. In order to test for stationarity with the presence of one or two SBs in our time series, we employed the CMR test developed by Clemente et al. (1998). The CMR test is based on the Perron and Vogelsang (1992) statistics, allowing for one or two SBs within the time series which can be attributed either to additive outliers (AO) or innovative outliers (IO). The CMR test is based on two different models: the AO model which detects a sudden change in the mean of a time series, and the IO model, which detects a gradual shift in the mean of a time series and better addresses persistent shocks. The null hypothesis of the CMR test is that the time series is non-stationary with SBs. In particular, the null hypothesis is accepted in favor of the alternative hypothesis if the t-statistic is lower than the critical value (in absolute values).

We run both AO and IO models but shall report the results of the latter, as it allows gradual mean shifts changes. At the first stage, we use the *clemio2* Stata command; if the variables are non-stationary, we then run the *clemio1* Stata command. **Table A.4** in Appendix presents the results of the CMR unit root test. We observe that, in the case of Greece, the GDP variable is non-stationary in the second difference. In the case of Spain, the GDP variable is I(2) with SBs. Moreover, the real exchange rate, the tourism receipts, and the tourism expenditure variables are all I(2) in the case of Ireland, as is the tourist arrivals variable in the Netherlands. In order to apply linear and nonlinear ARDL models to test for cointegration, the order of integration of the time series should be either I(0)/I(1), or a combination of both. Thus, the aforementioned variables are excluded from our empirical analysis of the ARDL and NARDL procedures.

The results of the CMR test indicate several breaks points, which are not uniformly distributed across the EA countries. To have a consistent analysis, we selected two breakpoints, taking into account the test results and the most significant events in the EA. The dummy variables included in the ARDL and NARDL models with SBs are the following: D_1 for the period 2000-01, used to capture the results of the establishment of the euro as a single currency in the EA countries, and D_2 for the period 2007-08, used to capture the effects of the financial crisis. The value given to each dummy variable is always zero, except at the specified intervals, where it is one.

Diagnostic Tests

To test the “quality” of the estimated ARDL and NARDL models, we conduct diagnostic tests on its residuals that should be assumed to be serially independent, normally distributed, and homoscedastic. In this study, we carry out the following diagnostic tests: (i) the Breusch-Godfrey test for serial correlation (LM test), (ii) the Breusch-Pagan test for heteroskedasticity, and (iii) the Ramsay reset test for functional form misspecification. The cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residuals squares (CUSUMSQ) tests are used to test for stability of the estimated long run coefficients within the critical value at 5%.

4.3 ARDL Results

Bounds Test Results of ARDL Models

Table A2 in Appendix displays the F_{PSS}-statistics of the ARDL bounds testing approach without and with SBs. The bounds test results of ARDL models without SBs are as follows: In Model 1, the null hypothesis is rejected for AT, FR, DE, LV, LU, PT, and BE. In Model 2, symmetric cointegration relationships are present for FI, FR, and LU. Finally, in Model 3, symmetric cointegration relationships exist for FI, LV, LU, and FR.

The F_{PSS} values detect the existence of symmetric cointegration among the variables of the ARDL models with SBs in several countries. In Model 1, the null hypothesis is rejected for most countries as AT, BE, FR, DE, IE, LV, LU, MT, PT, and FI. In Model 2, symmetric cointegration relationships are present for FI, DE, LV, and LU, as well as for FR, MT, and NL. Finally, in Model 3, symmetric cointegration relationships exist for FI, DE, LV, LU, NL, FR, and MT.

Dynamics Relationships of the ARDL Models without SBs

Since there is a symmetric long-run equilibrium relationship among the variables, the way in which tourism affects economic growth will be determined by estimating the dynamic coefficients. **Table A3** reports the dynamic coefficients of ARDL models without SBs. The estimated long-run coefficients of tourist arrivals are positive and statistically significant for AT, BE, FR, DE, LV, LU, and PT, confirming the TLEG hypothesis. Keeping other things constant, a 1% increase in tourist arrivals will increase economic growth by 0.7688% in FR, 0.5637% in LV, 0.4615% in PT, 0.4402% in BE, 0.3854% in LU, and 0.3009 in AT. The long-run elasticity of tourism receipts and tourism expenditure on economic growth are positive and significant for FR and LU. The long-run coefficient of the real exchange rate is negative and statistically significant for DE in Model 1, for FR in Models 2 and 3, and for LU in Model 2. Thus, an appreciation of the real exchange rates means a reduction in the economy's competitiveness; consequently, this will reduce a country's economic activity.

In the short run, empirical evidence indicates that the lagged one year of tourist arrivals variable has a positive and statistically significant impact on economic growth in AT, BE, FR, DE, and LV. The lagged one year of tourism receipts (tourism expenditure) will positively impact economic growth by 0.1175% (0.1169%) in FI, by 0.1260% (0.1053%) in LU and by 0.0839% (0.0790%) in FR. These empirical results verify the TLEG hypothesis. In addition, the short-run elasticity of the real exchange rate is negative and statistically significant for FR, FI, and LU in the Model 3.

Dynamics Relationships of the ARDL Models with SBs

From **Table A4**, we observe that the TLEG hypothesis verifies in more countries and models when SBs are presented in the ARDL model. The long-run estimated coefficient of tourist arrivals is positive and statistically significant in AT, BE, FR, DE, IE, LV, LU, MT, and PT. The long run elasticity of tourism receipts is positive and significant in FR, DE, LU, and the NL.

The short-run elasticity reveals that tourist arrivals positively and statistically significantly impact AT's economic growth by 0.8035%, LV by 0.5576%, IE by 0.4914%, DE by 0.3684%, IE by 0.4914%, and BE by 0.0905%. In Model 2, the lagged one year of tourism receipts will positively impact economic growth in DE, the NL, and FR. Finally, the TLEG hypothesis is verified in Model 3 for DE, FI, and the NL in the short run.

Tables A3 and **A4** report the diagnostic test, which indicates no sequence correlation, non-normality of the error term, and no heteroscedasticity in most ARDL models with SBs. We also applied CUSUM and CUSUMSQ tests that confirmed the stability of the models.

4.4 NARDL Results

Bounds Test Results of NARDL Models

Table 1 displays the F_{PSS} and t_{BDM} of the NARDL bounds testing approach without and with the presence of SBs. The bounds test results of the NARDL models without SBs indicate that the null hypothesis is rejected for LV and SK in Model 1, for FR and MT in Model 2, and for FR, DE, and MT in Model 3. The bounds test results of NARDL models with SBs are as follows: In Model 1, the null hypothesis is rejected for LV and the SK at a 1% significance level and for IE at a 5% significance level. In Model 2, we detected an asymmetric long-run relationship for BE, FR, and DE at a 1% significance level, as well as for FI and IT at a 5%

significance level. In Model 3, asymmetric cointegration relationships are present for DE and IE at a 1% significance level and for BE, and FI at a 5% significance level.

In the next step, the Wald tests examine the long-run and short-run asymmetries of each variable in EA countries, as seen in **Tables 2** and **3**. The Wald test results are displayed at the bottom of **Tables 2-3**. W_{LR} (W_{SR}) denotes the Wald tests, examining the null hypothesis of long run (short run) symmetry. In Model 1, the long-run asymmetry of the tourist arrivals variable is verified for LV. In addition, the significant short-run asymmetry of the tourism receipts variable is verified in Model 2 for FR and MT. Finally, the Wald test results strongly reject the null hypothesis of long-run symmetry of expenditure for FR, DE, and MT.

[**Tables 1, 2 and 3** Here]

Dynamics Relationships of the NARDL Models without SBs

The estimated NARDL models without SBs provide valuable conclusions (**Table 2**). In LV, the long-run coefficient of tourist arrivals' positive and negative elements is statistically significant at the 5% and 1% levels, respectively. Keeping other things constant, a 1% increase in tourist arrivals will increase economic growth by 0.206%, while a 1% decrease in tourist arrivals will reduce economic growth by 5.200%. We find that the magnitudes of the changes are asymmetric, i.e., the transmission elasticity of negative shocks in tourist arrivals is much greater than that of positive tourist arrivals shocks. This was confirmed from the Wald test which was equal to 28.33 (p-value: 0.001), indicating that the null hypothesis is rejected at a 1% significance level. In the SK, the long-run coefficient of the positive element of tourist arrivals is equal to 0.228 and is statistically significant at a 10% significance level; on the other hand, the coefficient of the negative element of tourist arrivals is negative and statistically insignificant even at the 10% level. In DE, the long-run coefficient of the positive element of tourism expenditure is equal to 0.105 and statistically significant at the 10% level. Specifically, a 1% increase (decrease) in tourism expenditure leads to a 0.105% (0.120%) increase (decrease) in GDP.

Dynamics Relationships of the NARDL Models with SBs

The long-run coefficients of the estimated NARDL models with SBs (**Table 3**) indicate that the impact of tourism variables rising or falling has asymmetric effects of a different magnitude on economic growth. For IE, in the long run, a 1% increase in tourist arrivals would increase GDP by 1.425%. On the other hand, a 1% decrease in tourist arrivals would reduce GDP by -2.304%. The transmission elasticity of positive tourist arrivals shocks in the economic growth is 0.879% less than that of negative tourist arrivals shocks. Similarly, in the case of LV, a positive shock in tourist arrivals has a positive effect on GDP, while a negative shock significantly reduces GDP. Thus, a 1% increase in the tourist arrivals increases GDP by 0.212%, while a 1% decrease in tourist arrivals causes a large decrease in GDP by 5.312%.

Finally, the long run asymmetric coefficient of a positive shock in tourist arrivals is significant in the case of the SK as well, whereas a negative tourist arrivals shock does not impact the economic growth. In the case of Belgium, the asymmetric long-run coefficient of tourism receipts (tourism expenditure) equals 0.331 (0.325) and 0.059 (0.061), respectively. Thus, a 1% increase in tourism receipts (tourism expenditure) leads to a 0.331% (0.325%) increase in economic growth. Furthermore, a 1% decrease in tourism receipts (tourism expenditure) leads to a 0.059% (0.061%) increase in economic growth. In Finland, the estimated long-run coefficient γ_1^+ in both Models 2 and 3 has a significant negative impact on economic growth, while γ_1^- is statistically insignificant.

5. CONCLUSIONS

This paper investigates the dynamic relationship between tourism, economic growth, and real exchange rate, finding evidence to support the TLEG hypothesis. We employ the linear and nonlinear ARDL cointegration approaches developed by Pesaran et al. (2001) and Shin et al. (2014), respectively. Following our empirical methodology, first, we examine the stationarity properties of time series using the CMR unit root test (with the presence of structural changes), and then we employ ARDL and NARDL models. Next, the ARDL and NARDL bounds test approaches were used to test the symmetric and asymmetric cointegration of the variables. We have verified the existence of symmetric and asymmetric long-run relationship in several specifications of ARDL and NARDL models without and with the presence of SBs. In particular, the F_{PSS} value in the case of ARDL models and the F_{PSS} and t_{BDM} values in the case of NARDL models also confirm the existence of symmetric and asymmetric relationships between the variables. In a next step, we examined the diagnostic properties of the ARDL and NARDL models.

This study supports the positive impact of tourism on economic growth for most EA economies using various tourism measures. Positive and negative tourism shocks and real exchange rates have shown differential effects on economic growth in sign and magnitude. The results indicate that the asymmetry impact exists in the long and short run for the tourism-economic growth nexus in EA countries. Our findings show that asymmetries and SBs matter when examining the TLEG hypothesis.

Table 1. The *F*-statistic of the NARDL Bounds Tests

Models	$F\left(\frac{gdp}{tour_1}, reef\right)$		$F\left(\frac{gdp}{tour_2}, reef\right)$		$F\left(\frac{gdp}{tour_3}, reef\right)$	
	Without SB					
	F_{PSS}	t_{BDM}	F_{PSS}	t_{BDM}	F_{PSS}	t_{BDM}
AT	1.1184	-1.4898	1.3206	-0.6491	1.3343	-0.6522
BE	1.0665	-1.8644	1.6876	-2.6047	1.4233	-2.3004
FI	0.7063	0.2891	1.0626	-2.2574	1.0876	-2.2844
FR	0.8665	-0.3956	8.3862	-0.8504	8.8713	-0.7493
DE	3.561	-3.8143	3.6917	-3.5515	4.7399	-4.0367
IE	0.9038	-1.4662				
IT	4.1372	-0.5489	1.2734	-1.8501	1.1056	-1.6864
LV	15.9760	2.3894	0.7396	-1.1812	0.6030	-0.9212
LU	0.6569	-1.1306	3.0179	-2.8084	3.4797	-2.9231
MT	1.7329	-2.2634	4.5067	-1.6927	4.5411	-1.9696
NL			2.7839	-2.6826		
PT	3.6184	-0.0036	0.4510	-0.3668	0.5130	-0.4347
SK	5.6575	-2.8014	2.1985	0.0074	2.0273	-0.2726
	With SB					
AT	0.7023	-1.1535	0.8823	-0.4358	1.7712	-1.0291
BE	1.5034	-1.8222	6.9192	-5.0881	4.5553	-4.4889
FI	1.6570	0.6685	4.9554	-4.3521	5.3667	-4.4518
FR	0.8210	-0.6800	7.9995	-1.3897	6.2931	-1.0750
DE	2.8795	-3.6421	6.2289	-3.0023	6.7604	-2.736
IE	3.0981	-2.8343				
IT	4.1236	-0.6235	4.8751	-4.4545	3.6778	-3.9918
LV	8.0418	-2.1084	0.9912	-0.2939	0.7997	-0.2207
LU	0.5659	0.3093	2.8334	-1.3937	3.7824	-2.5841
MT	1.7013	-0.6991	2.8302	-1.2264	2.9006	-1.4545
NL			4.0960	-4.3860	4.0077	-4.3699
PT	2.4018	-0.2822	0.3344	-0.6509	0.3735	-0.7311
SK	10.0341	-3.6088	1.4280	-0.1157	1.3123	-0.3655

Notes: The Critical Values come from Table CI(iii) Case III: Unrestricted intercept and no trend (p. 300: Perasan et al. 2001).

Table 2. Estimated Dynamic Coefficients: NARDL Models without SB

Countries	**FR**	**FR**	**DE**	**LV**	**MT**	**MT**	**SK**
Variables	$Model$ 2	$Model$ 3	$Model$ 3	$Model$ 1	$Model$ 2	$Model$ 3	$Model$ 1
γ_1^+	-1.484 (0.477)	-1.683 (0.3995)	0.105* (3.528)	0.206** (6.031)	-0.356* (4.08)	-0.326* (3.916)	0.228* (4.72)
$\boldsymbol{\gamma_1^-}$	-0.695 (0.8491)	-0.615 (0.726)	-0.120* (4.365)	-5.200*** (35.01)	-0.788 (0.8506)	-0.898 (1.326)	-0.426 (0.739)
$\boldsymbol{\gamma_2^+}$	0.044 (0.6847)	0.051 (0.5306)	0.005* (3.983)	0.028*** (39.66)	0.019* (5.221)	0.019** (7.236)	0.014*** (46.19)
$\boldsymbol{\gamma_2^-}$	0.058 (0.6686)	0.063 (0.5476)	0.005*** (54.54)	0.019** (9.616)	0.044* (5.192)	0.043** (7.393)	-0.038 (1.152)
$\boldsymbol{\delta_1}$	-0.5402* (-2.12)	-0.5791* (-2.29)	1.2202** (3.14)	-0.1987 (-0.82)	-0.4188 (-1.52)	-0.4065 (-1.62)	-0.0302 (-0.16)
$\boldsymbol{\varphi_0^+}$	0.0582 (1.76)	0.0584 (1.87)	-0.3194 (-1.80)	0.0294 (0.23)	0.2882* (2.12)	0.2599* (2.13)	-0.0197 (-1.19)
$\boldsymbol{\varphi_0^-}$	0.1292 (1.46)	0.1268** (2.43)	0.2174** (3.06)	-0.3749 (-1.13)	-0.2775 (-1.48)	-0.2383 (-1.42)	0.5040*** (8.16)
$\boldsymbol{\varphi_1^+}$	0.2383*** (4.18)	0.2394*** (4.34)	-0.5891** (-3.37)	0.2484** (2.74	0.3740* (2.14)	0.3293* (2.06)	-0.0663* (-2.13)
$\boldsymbol{\varphi_1^-}$	-0.1279*** (-2.50)	-0.1204* (-2.33)	-0.0064 (-0.48)	1.7878** (2.95)	-0.3279 (-1.53)	-0.3236 (-1.51)	-0.1166 (-1.13)
$\boldsymbol{\theta_0^+}$	-0.0026 (-1.20)	-0.0030 (-1.45)	0.0131 (1.85)	-0.0111** (-3.12)	0.0018 (0.31)	0.0011 (0.21)	0.0018 (1.05)
$\boldsymbol{\theta_0^-}$	-0.0034** (-2.72)	-0.0033** (-2.72)	-0.0043** (-3.29)	0.0010 (0.23)	-0.0107* (-2.27)	-0.0116** (-2.54)	0.0179 (1.87)
$\boldsymbol{\theta_1^+}$	-0.0030 (1.78)	-0.0034* (-2.03)	0.0153** (2.58)	0.0062 (1.77)	-0.0085 (-1.64)	-0.0092 (-1.87)	-0.0054** (-2.94)
$\boldsymbol{\theta_1^-}$	-0.0008 (-0.73)	-0.0010 (-0.88)	0.0029 (1.64)	-0.0060* (-2.30)	0.0048 (0.94)	0.0040 (0.83)	0.0031 (0.99)
$\boldsymbol{R^2}$	0.9432	0.9460	0.9363	0.9852	0.8531	0.8625	0.9494
adj R^2	0.8296	0.8379	0.8090	0.9555	0.5592	0.5874	0.8481
Breusch-Godfrey LM	14.12 [0.1181]	14.55 [0.1041]	12.81 [0.1715]	2.806 [0.9715]	7.902 [0.5441]	7.501 [0.5851]	12.93 [0.1658]
Breusch-Pagan	0.1714 [0.6789]	0.1921 [0.6611]	0.0124 [0.9113]	0.3663 [0.5451]	1.182 [0.2769]	1.206 [0.2721]	8.936 [0.0028]
Ramsey test	1.085 [0.4510]	0.7683 [0.5686]	1.677 [0.3079]	4.793 [0.0821]	7.329 [0.0421]	7.632 [0.0394]	0.1666 [0.9136]
$\boldsymbol{W_{LR}^{tour}}$				28.33*** [0.001]			
$\boldsymbol{W_{LR}^{reef}}$			13.85*** [0.007]	23.21*** [0.002]			
$\boldsymbol{W_{SR}^{tour}}$	9.563** [0.018]	9.644** [0.017]	10.48** [0.014]		6.054** [0.043]	6.081** [0.043]	11.91** [0.011]
$\boldsymbol{W_{SR}^{reef}}$			6.214** [0.041]				5.592** [0.050]

Table 3. Estimated Dynamic Coefficients: NARDL Models with SBs

Countries	BE		FI		FR		DE		IE	IT	LV	SK
Variables	*Model* 2	*Model* 3	*Model* 2	*Model* 3	*Model* 2	*Model* 3	*Model* 2	*Model* 3	*Model* 1	*Model* 2	*Model* 1	*Model* 1
γ_1^+	0.331*** (42.48)	0.325*** (25.49)	-0.506** (10.6)	-0.515** (11.15)	-0.157 (0.0557)	-0.496 (0.2238)	0.104* (4.484)	0.101 (3.96)	1.425*** (70.39)	-0.097 (0.7886)	0.212* (4.791)	0.207** (12.41)
γ_1^-	0.059** (7.132)	0.061* (4.737)	0.085 (0.3287)	0.047 (0.1184)	-1.146 (2.473)	-0.990 (1.681)	0.136 (0.552)	0.105 (0.3124)	-2.304*** (21.99)	-0.778 (0.106)	-5.312*** (-25.06)	-0.072 (0.5948)
γ_2^+	-0.003 (2.247)	-0.004 (1.81)	0.026** (8.096)	0.027** (8.855)	0.014 (0.6506)	0.021 (0.5388)	-0.002 (0.409)	-0.001 (0.1396)		0.015*** (17.9)	0.028*** (30.7)	0.012*** (85.34)
γ_2^-	-0.003 (3.44)	-0.003 (2.682)	0.014* (5.566)	0.015** (6.76)	0.033 (1.507)	0.039 (1.041)	0.004** (9.163)	0.004** (9.763)		0.015 (1.29)	0.020** (6.976)	-0.039 (3.654)
δ_1	0.2586 (1.00)	0.4209 (1.14)	-0.1105 (-0.35)	-0.1210 (-0.40)	-0.3537 (-0.98)	-0.4505 (-1.06)	0.3301 (0.58)	0.4135 (0.71)	-0.0657 (-0.30)	0.9113** (3.37)	-0.2054 (-0.75)	-0.0774 (-0.47)
φ_0^+	0.1371** (2.84)	0.1295 (2.02)	-0.1346 (-1.29)	-0.1251 (-1.28)	0.0630* (2.10)	0.0593 (1.80)	0.0877 (0.48)	0.0491 (0.21)	0.2475 (0.58)	0.2059* (2.10)	0.0252 (0.17)	-0.0192 (-1.46)
φ_0^-	0.0126 (0.43)	0.0153 (0.39)	0.1250 (1.78)	0.1249 (1.87)	0.2261** (3.24)	0.2360** (3.02)	0.1113 (1.30)	0.1184 (1.39)	1.9214*** (3.17)	0.2880*** (4.79)	-0.4213 (-1.02)	0.4154*** (5.91)
φ_1^+	-0.1873* (-2.52)	-0.2005 (-1.82)	0.0861 (0.99)	0.0927 (1.10)	0.2642** (3.18)	0.2283* (2.43)	-0.1695 (-0.80)	-0.2272 (-0.91)	-0.2863 (-0.52)	-0.2128 (-1.83)	0.2647** (2.54)	-0.1002*** (-3.23)
φ_1^-	0.0416 (1.35)	0.0394 (0.95)	0.1836 (1.83)	0.1690 (1.83)	-0.2591* (-2.48)	-0.2127 (-1.72)	0.1115 (0.91)	0.1073 (0.92)	-0.3119 (-0.61)	-0.2875** (-3.09)	1.7704** (2.59)	-0.0741 (-0.82)
θ_0^+	-0.0015 (-0.62)	-0.0012 (-0.37)	0.0009 (0.20)	0.0008 (0.18)	-0.0021 (-1.08)	-0.0028 (-1.26)	-0.0028 (-0.33)	-0.0012 (-0.12)		0.0002 (0.18)	-0.0124** (-2.82)	0.0014 (0.94)
θ_0^-	-0.0017 (-0.55)	-0.0014 (-0.33)	-0.0096** (-2.68)	-0.0096** (-2.79)	-0.0019 (-0.86)	-0.0027 (-1.01)	-0.0040** (-3.35)	-0.0040** (-3.46)		-0.0103*** (-5.68)	0.0028 (0.51)	0.0253** (3.02)
θ_1^+	0.0022 (0.77)	0.0031 (0.77)	-0.0019 (-0.37)	-0.0022 (-0.44)	-0.0023 (-1.88)	-0.0026 (-2.00)	0.0028 (0.43)	0.0042 (0.55)		0.0038 (1.46)	-0.0060 (1.52)	-0.0069*** (-4.31)
θ_1^-	-0.0015 (-0.62)	-0.0003 (-0.12)	-0.0047 (-1.42)	-0.0045 (-1.42)	-0.0011 (-1.06)	-0.0010 (-0.87)	0.0007 (0.37)	0.0011 (0.50)		0.0075** (3.59)	-0.0054 (-1.79)	0.0034 (1.34)
D_1	-0.0253 (-1.69)	-0.0241 (-1.19)	-0.0165 (-0.71)	-0.0166 (-0.74)	-0.0200 (-1.02)	-0.0127 (-0.56)	0.0168 (0.95)	0.0167 (0.99)	0.0441 (0.88)	0.0544*** (0.011)	-0.0130 (-0.65)	0.0140 (0.99)
D_2	0.0275** (3.14)	0.0248* (2.13)	0.0784** (3.64)	0.0777** (3.79)	-0.0245 (-1.97)	-0.0185 (-1.35)	0.0285 (1.65)	0.0269 (1.58)	-0.0978** (-2.57)	-0.0056 (0.568)	0.0121 (0.46)	0.0331 (1.70)
R^2	0.9281	0.8736	0.9443	0.9483	0.9681	0.9607	0.9655	0.9673	0.7341	0.9764	0.9867	0.9772
adj R^2	0.6981	0.4689	0.7661	0.7830	0.8660	0.8348	0.8552	0.8625	0.4923	0.9008	0.9439	0.9041
Breusch-Godfrey LM test	6.006 [0.7393]	4.884 [0.8443]	15.74 [0.0726]	15.8 [0.0711]	15.87 [0.0696]	15.71 [0.0731]	15.52 [0.0777]	14.99 [0.0911]	6.125 [0.7273]	18.1 [0.0340]	5.208 [0.8158]	10.38 [0.3209]
Breusch-Pagan test	0.0107 [0.9175]	0.0048 [0.8982]	1.973 [0.1602]	2.093 [0.1480]	0.0686 [0.7933]	0.1191 [0.7300]	0.6772 [0.4105]	0.7401 [0.3896]	9.134 [0.0025]	0.4448 [0.5048]	0.1825 [0.6693]	6.122 [0.0133]
Ramsey test	0.9768 [0.5418]	11.61 [0.0803]	1.589 [0.4088]	1.577 [0.4108]	0.1457 [0.9240]	0.7779 [0.6062]	0.2896 [0.8334]	0.2663 [0.8475]	10.6 [0.0037]	0.8687 [0.5744]	2.402 [0.3075]	4.961 [0.1723]
W_{LR}^{tour}	31.4*** [0.003]	19.06*** [0.007]	5.224* [0.071]	6.839** [0.047]					6.872** [0.024]	4.378* [0.091]	20.68*** [0.006]	
W_{LR}^{reef}			13.36** [0.015]	14.97** [0.012]						6.674* [0.063]	17.24*** [0.009]	
W_{SR}^{tour}					11.18** [0.020]	8.639** [0.032]						17.66*** [0.008]
W_{SR}^{reef}												13.27** [0.015]

Notes: *** $p<0.01$, ** $p<0.05$, and * $p<0.1$. Value in () are t-statistics of estimates. Value in [] are p-values of diagnostics tests.

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Appendix A

Table A1. CMR Unit Root Test Results

		Lags	breakpoints		t-stat
	GDP				
AT	Level	AR(0)	2004**	2008	-2.239
	D	AR(1)	1999**	2008	**-6.069**
BE	Level	AR(0)	2002*	2013**	-3.385
	D	AR(0)	1999	2006*	**-5.595**
CY	Level	AR(1)	2002**		-3.657
	D	AR(0)	2008**		-4.539
FI	Level	AR(0)	1998	2002	-2.850
	D	AR(1)	2007***	2015**	**-6.434**
FR	Level	AR(0)	2008	2016*	-3.368
	D	AR(0)	2000***	2008	**-6.950**
DE	Level	AR(4)	2004***	2008	-3.520
	D	AR(1)	2004**	2008*	**-8.989**
GR	Level	AR(1)	2005		-3.704
	D	AR(0)	1999		-3,965
	DD	AR(0)	2010**		-5,062
IE	Level	AR(1)	2008*	2013**	**-5.989**
IT	Level	AR(1)	2010*		-3,070
	D	AR(0)	2002		-4,905
LV	Level	AR(3)	1998	2009**	-3.203
	D	AR(1)	2006***	2012**	**-8.503**
LU	Level	AR(0)	1998*	2003	-2.826
	D	AR(1)	1999**	2006**	**-6.508**
MT	Level	AR(4)	1998	2012**	-2.168
	D	AR(0)	1999*	2012**	**-11.194**
NL	Level	AR(0)	2003		-2.673
	D	AR(0)	2002		-5.502
PT	Level	AR(0)	2009**	2014**	-4.273
	D	AR(4)	2006***	2014**	**-5.563**
SK	Level	AR(1)	1999**	2009*	-2.459
	D	AR(1)	2002***	2007**	**-6.893**
ES	Level	AR(1)	2002		-2.719
	D	AR(1)	2010		-1.92
	DD	AR(1)	2008		-5.684

		Lags	breakpoints		t-stat
	$reef$				
AT	Level	AR(0)	2001**	2008	-4.313
	D	AR(0)	2001**	2005	-5.599
BE	Level	AR(0)	2001***		-3.857
	D	AR(0)	2002		-5.310
CY	Level	AR(0)	2013**		-1.997
	D	AR(0)	2008**		-4.539
FI	Level	AR(0)	2008***		-5.079
FR	Level	AR(0)	2008***		-3.595
	D	AR(0)	2002		-4.934
	Level	AR(0)	2008***		-4.579
GR	Level	AR(0)	2001***	2013	-3850
	D	AR(2)	1999	2010	-5796
IE	Level	AR(0)	1999		-1.747
	D	AR(0)	2r007**		-3.930
	DD	AR(0)	2002		5.781
IT	Level	AR(0)	2013*		-2.215
	D	AR(3)	2002		-6.836
LV	Level	AR(2)	1998	2006	-6.250
LU	Level	AR(0)	2001***	2013	-5.432
	D	AR(0)	2000**	2008	-5.996
MT	Level	AR(0)	2013		-2.122
	D	AR(0)	2008**		-5.013
NL	Level	AR(0)	2001***	2008	-6.173
PT	Level	AR(0)	1999		-2.098
	D	AR(0)	2002		-4.859
SK	Level	AR(0)	2001***	2005	**-5.548**
ES	Level	AR(0)	1999**		-2.675
	D	AR(4)	2007**		-3.883
	DD	AR(3)	2002*		-5.223

		Lags	breakpoints		t-stat
	$tour_1$				
AT	Level	AR(1)	2010 **	2014*	-1.072
	D	AR(0)	2009**	2013	-9.185
BE	Level	AR(0)	2004	2009	-1.417
	D	AR(1)	2008	2014	**-6.310**
CY	Level	AR(1)	1998	2014***	-4.660
	D	AR(3)	1999	2013***	**-6.987**
FI	Level	AR(0)	2004**	2011**	-4.179
	D	AR(1)	2011***	2015***	-8.143
FR	Level	AR(0)	2004	2009**	-4.493
	D	AR(0)	1999**	2006	-5.095
DE	Level	AR(0)	2002**	2009**	-3.105
	D	AR(0)	1999*	2003**	-6.385
EL	Level	AR(0)	2003	2012***	-3.915
	D	AR(1)	2000**	2011***	-6.393
IE	Level	AR(1)	2001**	2011***	-3.703
	D	AR(1)	2006**	2012**	-4.426
IT	Level	AR(0)	2004***	2014***	-4.076
	D	AR(1)	2001	2003**	-6.603
LV	Level	AR(0)	2002***	2012**	-3.601
	D	AR(2)	2002***	2007***	-5.507
LU	Level	AR(0)	2000	2012***	-3.472
	D	AR(3)	1999	2009	-4.238
MT	Level	AR(0)	2005**	2013***	-2.431
	D	AR(0)	2006	2014**	-5.580
NL	Level	AR(0)	2011***	2016**	-4.425
	D	AR(4)	2007	2016	-3.258
PT	Level	AR(0)	2005***	2012***	-4.478
	D	AR(1)	2003	2006	-5.923
SK	Level	AR(0)	1999***	2011***	-9.099
ES	Level	AR(0)	2000	2012***	-3.760
	D	AR(0)	2006**	2008*	-5.740

		Lags	Breakpoints		t-stat			Lags	breakpoints		t-stat
	$tour_2$						$tour_3$				
AT	Level	AR(0)	2001***	2013	-4.275	**AT**	Level	AR(0)	1998	2001***	-4.699
	D	AR(1)	2001***	2007***	-5.760		D	AR(1)	2001***	2007***	**-5.695**
BE	Level	AR(0)	2002***	2013***	-5.649	**BE**	Level	AR(0)	2002***	2013***	-5.346
CY	Level	AR(4)	2007**	2011***	-0.139		D	AR(3)	2006***	2013***	**-9.087**
	D	AR(3)	2007***	2012***	-6.312	**CY**	Level	AR(1)	2011	2015**	-5.308
FI	Level	AR(3)	2001***	2012**	-5.360		D	AR(3)	2007***	2012***	**-6.540**
	D	AR(1)	2012*	2014***	-9.648	**FI**	Level	AR(1)	2005***		-3.725
FR	Level	AR(0)	2002*	2005	-3.490		D	AR(3)	2012**		-4.319
	D	AR(1)	2007**	2012	-7.045	**FR**	Level	AR(0)	2002**	2005	-3.562
DE	Level	AR(0)	2002***	2005**	-4.639		D	AR(1)	2007**	2012	**-7.089**
	D	AR(1)	2001***	2007***	-6.369	**DE**	Level	AR(0)	2002***	2005**	-4.721
EL	Level	AR(1)	2002**	2011*	-6.007		D	AR(1)	2001***	2007***	**-6.464**
IE	Level	AR(1)	1998*		-2.552	**EL**	Level	AR(1)	2002**	2011	**-6.094**
	D	AR(0)	2011		-4.184	**IE**	Level	AR(0)	2003	2007	-1.932
	DD	AR(0)	2008		-7.403		D	AR(0)	2007***	2011**	-5.095
IT	Level	AR(1)	2004**		-3.502	**IT**	Level	AR(4)	2004***	2011***	**-5.598**
	D	AR(0)	2000		-4.328	**LV**	Level	AR(0)	1998	2000**	-4.601
LV	Level	AR(0)	1998	2000**	-4.363		D	AR(0)	2000***	2007***	**-6.646**
	D	AR(0)	2000***	2007***	-6.647	**LU**	Level	AR(0)	2000***	2009**	**-6.067**
LU	Level	AR(0)	2000***	2002***	-5.706	**MT**	Level	AR(0)	2005	2012	-2.871
MT	Level	AR(1)	2009**	2012*	-3.801		D	AR(1)	2002***	2012**	**-9.160**
	D	AR(1)	2002***	2012	-9.737	**NL**	Level	AR(0)	2005**	2015*	-3.649
NL	Level	AR(0)	2005***	2015**	-3.863		D	AR(1)	2003	2007	**-6.196**
	D	AR(1)	2003	2007	-6.213	**PT**	Level	AR(0)	2005***	2015**	-2.713
PT	Level	AR(0)	2005**	2015***	-2.678		D	AR(1)	2002**	2007	-5.009
	D	AR(1)	2001**	2011*	-6.485	**DK**	Level	AR(4)	1999	2004***	-4.732
SK	Level	AR(4)	1999	2004	-4.355		D	AR(0)	1999***	2007***	**-7.866**
	D	AR(0)	1999***	2007***	-7.664	**ES**	Level	AR(0)	2002**	2005	-2.925
ES	Level	AR(0)	2001	2016***	-4.730		D	AR(1)	2001**	2007***	**-6.495**
	D	AR(1)	2001*	2007**	-6.111						

Notes: a) *** p<0.01, **p<0.05, and *p<0.1. b) The critical value at 5% sign. level is 5.590 for the case of *clemio2* and -4.270 for *clemio1*.

Table A2. The *F*-statistics of the ARDL Bounds Tests

	Without SB			With SB		
	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$	$Model\ 2$	$Model\ 3$
$\boldsymbol{F_{PSS}}$	$F\left(\frac{gdp}{tour_1}, reef\right)$	$F\left(\frac{gdp}{tour_2}, reef\right)$	$F\left(\frac{gdp}{tour_3}, reef\right)$	$F\left(\frac{gdp}{tour_1}, reef\right)$	$F\left(\frac{gdp}{tour_2}, reef\right)$	$F\left(\frac{gdp}{tour_3}, reef\right)$
AT	10.484	1.832	1.106	8.621	1.236	2.980
BE	5.210	3.310	3.309	6.986	3.8565	3.954
FI	3.320	7.187	7.204	5.640	12.292	12.244
FR	7.707	6.650	6.248	6.896	5.968	5.642
DE	10.983	2.485	3.007	18.636	6.563	8.770
IE	1.589			7.460		
IT	4.053	1.349	1.401	2.861	2.963	2.782
LV	13.930	2.592	12.699	9.619	19.389	17.870
LU	7.453	11.771	7.747	18.276	18.590	24.364
MT	4.111	3.133	3.165	7.568	5.755	5.445
NL		2.602	2.567		6.091	6.489
PT	10.434	4.463	4.290	15.354	2.629	2.915
SK	1.238	2.154	2.264	4.380	2.577	2.386

Notes: a) *F*-statistic is used to test for the joint significance of coefficients of the lagged levels in the ARDL-ECM. b) Critical values are derived from PSS (2001), Table CI(iii) case III: Unrestricted intercept and no trend, and k=2, 95% and 99% level of significance are (3.79;4.85) and (5.15;6.36) respectively.

Table A3. Estimated Dynamic Coefficients: ARDL Models without SB

	AT	BE	FI		FR			DE	LV		LU			PT
ARDL(p, q1, q2)	**(1 2 3)**	**(1, 0, 0)**	**(1,1,1)**	**(1,1,1)**	**(1, 0, 0)**	**(1,0,0)**	**(1,0,0)**	**(2, 2, 1)**	**(2,2,0)**	**(3,3,1)**	**(3,1,0)**	**(1,3,3)**	(1,2,3)	(1,2,3)
	$Model\ 1$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$	$Model\ 1$	$Model\ 3$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$
γ_1	0.3009*** (4.52)	0.4402*** (3.88)	-0.1242 (-0.65)	-0.1315 (-0.67)	0.7688*** (6.00)	0.2468*** (4.67)	0.2188*** (4.72)	0.2730*** (24.12)	0.5637*** (19.96)	0.0975 (0.30)	0.3854*** (2.99)	0.5057*** (8.41)	0.2256*** (5.07)	0.4615** (2.83)
γ_2	0.0267*** (3.29)	-0.0015 (-0.46)	-0.0111 (-1.38)	-0.0119 (-1.44)	0.0017 (0.88)	-0.0046*** (-2.95)	-0.0044*** (-2.96)	-0.0015** (-2.36)	0.0002 (0.51)	0.0665 (1.50)	0.0012 (0.15)	-0.0282*** (-4.83)	-0.0088 (-1.33)	0.0152* (1.86)
ECM_{t-1}	-0.3135*** (-4.24)	-0.1987*** (-2.96)	-0.1706** (-2.60)	-0.1671** (-2.50)	-0.3948*** (-4.33)	-0.3401*** (-4.06)	-0.3612*** (-3.76)	-1.4161*** (-5.36)	-0.5615*** (-5.25)	0.145 (1.29)	-0.4459*** (-3.14)	-0.7659*** (-5.46)	-0.5910*** (-3.98)	-0.2298** (-2.35)
δ_0								0.4734** (2.65)	0.2564* (2.00)	0.3347* (1.97)	0.1134 (0.62)	0.1587 (1.07)	0.3675* (2.02)	
δ_1										-0.4719*** (-3.58)	-0.4220** (-2.25)			
φ_0	0.5807*** (3.99)	0.0874* (2.03)	0.1175*** (2.99)	0.1169*** (3.00)	0.3036*** (2.95)	0.0839*** (2.57)	0.0790*** (2.42)	0.2524*** (3.37)	0.5606*** (7.22)	0.0562 (1.08)	-0.0671 (-0.55)	0.1053* (2.00)	0.1260* (2.01)	0.0161 (0.57)
φ_1	-0.3667** (-2.11)							-0.1271 (-1.23)	0.1455 (1.73)	-0.0819** (-2.21)		-0.3587*** (-5.55)	-0.2405*** (-3.56)	-0.0556* (-1.97)
φ_2										-0.0735* (-1.94)		-0.2202** (-2.84)		
θ_0	0.0054** (2.94)	-0.0003 (-0.32)	-0.0044** (-2.43)	-0.0045** (-2.48)	0.0006 (0.81)	-0.0015** (-2.62)	-0.0016** (-2.63)	0.0006 (0.63)	0.0001 (0.40)	-0.0075*** (-4.65)	0.0005 (0.15)	-0.0051 (-1.63)	-0.0018 (-0.50)	-0.0033 (-1.65)
θ_1	-0.0052*** (-3.13)											0.0133*** (3.41)	0.0056 (165)	-0.0051** (-2.23)
θ_2	-0.0027* (-2.14)											0.0093*** (3.35)	0.0064** (2.29)	-0.0036 (-1.54)
Diagnostic tests														
R^2	0.8016	0.4513	0.6769	0.6804	0.5489	0.5122	0.4966	0.8264	0.9131	0.9359	0.6573	0.8766	0.7888	0.7437
$adj\ R^2$	0.6693	0.3647	0.5819	0.5864	0.4777	0.4352	0.4172	0.7396	0.8784	0.8835	0.5104	0.7531	0.6160	0.5729
Breusch-Godfrey LM	0.112 [0.7379]	0.083 [0.7739]	2.176 [0.1402]	2.071 [0.1502]	0.380 [0.5376]	0.302 [0.5825]	0.655 [0.4184]	0.884 [0.3470]	0.490 [0.4841]	3.092 [0.0787]	0.426 [0.5137]	0.337 [0.5615]	0.094 [0.7596]	0.501 [0.4789]
Breusch-Pagan	0.12 [0.7294]	0.02 [0.8871]	1.95 [0.1626]	1.90 [0.1682]	0.53 [0.4667]	0.25 [0.6159]	0.47 [0.4913]	0.20 [0.6532]	0.120 [0.7892]	0.44 [0.5056]	0.07 [0.7910]	2.39 [0.1218]	0.48 [0.4902]	0.21 [0.7817]
Ramsey test	1.65 [0.2465]	0.67 [0.5845]	0.11 [0.9546]	0.10 [0.9574]	0.55 [0.6537]	1.15 [0.3595]	1.54 [0.2427]	0.70 [0.5705]	1.74 [0.2129]	4.95 [0.0314]	0.23 [0.8761]	2.00 [0.1929]	0.78 [0.5327]	1.03 [0.4227]

Notes: *** p<0.01, **p<0.05, and *p<0.1. Value in () are t-statistics of estimates. Value in [] are p-values of diagnostics tests.

Table A4. Estimated Dynamic Coefficients: ARDL Models with SB

	AT	**BE**	**FI**			**FR**			**DE**			**IE**
ARDL(p, q1, q2)	**(1,2,3)**	**(1,0,0)**	**(1,1,0)**	**(1,1,3)**	**(1,1,3)**	**(1,0,0)**	**(1,0,0)**	**(1,0,0)**	**(2,3,1)**	**(3,3,3)**	**(3,3,3)**	**(1, 0)**
	Model 1	*Model* 1	*Model* 1	*Model* 2	*Model* 3	*Model* 1	*Model* 2	*Model* 3	*Model* 1	*Model* 2	*Model* 3	*Model* 1
γ_1	0.3024*** (4.10)	0.4462*** (4.07)	0.1072 (0.89)	0.0071 (0.09)	0.0023 (0.31)	0.7580*** (4.37)	0.2439*** (3.31)	0.2154*** (3.31)	0.2703*** (30.61)	0.1472** (2.92)	0.1442** (3.28)	1.1044*** (9.68)
γ_2	0.0275 (1.80)	-0.0064 (-0.98)	-0.0117** (-2.36)	-0.0133** (-2.90)	-0.0138** (-3.01)	0.0014 (0.54)	-0.0047** (-2.32)	-0.0046** (-2.32)	-0.0014** (-2.59)	-0.0017 (-0.45)	-0.0032 (-1.13)	
ECM_{t-1}	-0.3118*** (-3.21)	-0.2030*** (-3.01)	-0.2995*** (-3.96)	-0.3856 (-3.64)	-0.3801*** (-3.53)	-0.3966*** (-4.01)	-0.3437*** (-3.76)	-0.3656*** (-3.42)	-1.7315*** (-6.33)	0.3207 (1.84)	0.3455* (2.28)	-0.4450*** (-3.80)
δ_0									0.5884*** (3.35)	-0.6314 (-1.78)	-0.6346* (-2.15)	
δ_1										-0.7068*** (-4.01)	-0.7173*** (-4.88)	
φ_0	0.8035*** (5.42)	0.0905* (2.05)	0.0321 (0.78)	0.1349*** (3.53)	0.1333*** (3.49)	0.3007** (2.44)	0.0838* (2.06)	0.0787* (1.91)	0.3684*** (4.34)	0.2095*** (5.04)	0.2225*** (6.11)	0.4914*** (3.77)
φ_1	-0.2203 (-1.49)								-0.2637** (-2.60)	0.1032 (1.05)	0.1089 (1.28)	
φ_2									-0.0698 (-1.23)	0.1015* (2.06)	0.1033** (2.39)	
θ_0	0.0070*** (4.46)	-0.0013 (-1.22)	-0.0035** (-2.16)	- 0.0061*** (-3.82)	-0.0062*** (-3.87)	0.0005 (0.51)	-0.0016** (-2.27)	-0.0017** (-2.34)	0.001 (0.96)	-0.0060*** (-6.37)	-0.0059*** (-7.16)	
θ_1	-0.0065*** (-4.54)			0.0015 (0.89)	0.0015 (0.90)					-0.0053* (-1.90)	-0.0058** (-2.41)	
θ_2	-0.0051*** (-3.81)			0.0036** (2.31)	0.0035** (2.29)					-0.0042** (-2.86)	-0.0043** (-3.40)	
D_1	-0.0316* (-2.05)	-0.0155 (-1.23)	-0.0159 (-0.66)	-0.0134 (-0.65)	-0.0144 (-0.69)	0.0018 (0.50)	0.0024 (0.18)	0.0026 (0.19)	0.0310* (1.83)	0.0073 (0.39)	0.0084 (0.54)	0.0365 (0.78)
D_2	-0.0252* (-2.19)	0.0146 (1.63)	0.0457** (2.30)	0.0568*** (3.71)	0.0562*** (3.66)	0.0027 (0.68)	0.0028 (0.28)	0.0035 (0.34)	0.0211** (2.51)	0.0277** (2.43)	0.0267** (0.029)	-0.0539 (-1.65)
Diagnostic tests												
R^2	0.8027	0.5556	0.6241	0.8470	0.8470	0.5522	0.5165	0.5025	0.9322	0.9553	0.9658	0.5179
adj R^2	0.6054	0.4250	0.4831	0.7218	0.7219	0.4205	0.3742	0.3562	0.8645	0.8722	0.9024	0.4108
Breusch-Godfrey LM	0.083 [0.7738]	0.595 [0.4407]	1.365 [0.2428]	1.342 [0.2467]	1.205 [0.2724]	0.672 [0.4122]	0.523 [0.4698]	1.051 [0.3053]	0.293 [0.5884]	1.064 [0.3023]	5.475 [0.0193]	0.253 [0.6147]
Breusch-Pagan	0.09 [0.7640]	0.09 [0.7671]	0.78 [0.3763]	0.04 [0.8515]	0.23 [0.6976]	0.44 [0.5049]	0.24 [0.6275]	0.44 [0.5049]	3.07 [0.0796]	0.63 [0.4289]	0.25 [0.6149]	0.69 [0.4052]
Ramsey test	1.42 [0.3152]	0.97 [0.4339]	1.23 [0.3401]	0.52 [0.6782]	0.55 [0.6635]	0.65 [0.5957]	1.19 [0.3492]	1.58 [0.2394]	0.35 [0.7904]	2.63 [0.1288]	1.35 [0.3769]	0.37 [0.7753]

(continued)

Countries	LV			LU			MT			NL		PT
ARDL(p, q1, q2)	**(2,2,0)**	**(3, 3, 0)**	**(3,3,0)**	**(3,2,0)**	**(3,3,3)**	**(3,2,3)**	**(3, 2, 0)**	**(3,3,0)**	**(3,3,0)**	**(2,3,3)**	**(2,3,3)**	**(1,1,2)**
Variables	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 1$	$Model\ 2$	$Model\ 3$	$Model\ 2$	$Model\ 3$	$Model\ 1$
γ_1	0.5637*** (15.85)	-1.2863 (-0.22)	-0.1072 (-0.18)	0.4808*** (5.44)	0.4967*** (7.31)	0.2398*** (8.12)	0.4195* (2.06)	0.8881 (1.39)	0.7340 (1.26)	0.3843*** (10.46)	0.3622*** (11.46)	0.3926*** (3.40)
γ_2	0.0017 (0.60)	0.2633 (0.30)	0.0893 (1.19)	-0.0093 (-1.18)	-0.0440** (-3.96)	-0.0269** (-3.38)	-0.0284 (-0.82)	-0.0671 (-0.83)	-0.0856 (-0.63)	0.0003 (0.17)	0.0001 (0.16)	0.0069 (1.07)
ECM_{t-1}	-0.5491*** (-4.67)	0.0361 (0.30)	0.1092 (1.11)	-0.5103*** (-4.50)	-0.5467** (-3.53)	-0.5726*** (-4.89)	-0.2705 (-1.22)	-0.0935 (-1.03)	-0.0794 (-0.72)	-0.5412*** (-4.14)	-0.5723*** (-4.28)	-0.2098*** (-3.18)
δ_0	0.2742* (1.91)	0.4100*** (3.57)	0.4009*** (3.30)	-0.5054* (-2.62)	-0.0869 (-0.54)	-0.0671 (-0.44)	-0.5551* (-2.12)	-0.8626* (-1.87)	-0.8504* (-1.89)	0.5209** (3.00)	0.5598** (3.26)	
δ_1		-0.4348*** (-3.75)	-0.4579*** (-3.92)	0.0228 (0.80)	-0.3152* (-2.05)	-0.2910* (-2.20)	-0.4603* (-2.12)	-0.6566** (-2.39)	-0.6671** (-2.44)			
φ_0	0.5576*** (6.59)	0.0887 (1.53)	0.0582 (1.07)	-0.0975 (-1.07)	0.0235 (0.47)	0.0259 (0.53)	-0.0833 (-0.37)	-0.2324 (-1.81)	-0.2535* (-1.93)	0.1164** (2.52)	0.1169** (2.62)	0.0463 (1.65)
φ_1	0.1466 (1.59)	-0.1217*** (-3.36)	-0.1220** (-3.18)	-0.0047 (-1.46)	-0.2829** (-4.87)	-0.1980*** (-4.43)		-0.1447 (-1.50)	-0.1395 (-1.52)	-0.2008*** (-3.51)	-0.2022*** (-3.66)	
φ_2		-0.0570 (-1.45)	-0.0632 (-1.61)		-0.0936 (-1.15)			-0.1744 (-1.45)	-0.1773 (-1.52)	-0.0884** (-2.32)	-0.0850** (-2.32)	
θ_0	0.0009 (0.20)	-0.0095*** (-6.33)	-0.0097*** (-6.36)		-0.0086** (-3.12)	-0.0060** (-2.50)	-0.0109** (-2.83)	-0.0062** (-2.56)	-0.0068** (-2.86)	-0.0017 (-1.25)	-0.0018 (-1.31)	-0.0038** (-2.19)
θ_1					0.0105** (3.23)	0.0064** (2.80)				0.0035* (2.28)	0.0037** (2.43)	-0.0031* (-1.87)
θ_2					0.0062** (2.50)	0.0059** (3.37)				0.0024* (2.29)	0.0024** (2.32)	
D_1	0.0024 (0.10)	0.0308 (0.98)	0.0211 (0.68)	-0.0066 (-0.30)	-0.0244 (-1.27)	-0.0234 (-1.36)	-0.0820* (-1.93)	-0.0034 (-0.25)	-0.0100 (-0.14)	0.0430** (2.49)	0.0444** (2.63)	-0.0053 (-0.35)
D_2	-0.0077 (-0.40)	0.0301 (1.67)	0.0323 (1.62)	0.0673*** (3.72)	0.0469** (2.80)	0.0645*** (4.03)	0.0675 (1.73)	0.0820** (2.70)	0.0849** (2.78)	0.0294* (1.97)	0.0295* (2.04)	0.0327** (2.59)
Diagnostic tests												
R^2	0.9143	0.9520	0.9488	0.8569	0.9469	0.9430	0.7587	0.7429	0.7497	0.8911	0.8958	0.7830
adj R^2	0.8616	0.9039	0.8977	0.7397	0.8484	0.8575	0.5612	0.4859	0.4994	0.7276	0.7395	0.6745
Breusch-Godfrey LM	1.231 [0.2671]	0.928 [0.3353]	1.221 [0.2691]	0.329 [0.5663]	8.067 [0.0045]	3.922 [0.0477]	3.089 [0.0788]	2.532 [0.1115]	2.930 [0.0870]	0.295 [0.5869]	0.561 [0.4537]	0.090 [0.7642]
Breusch-Pagan	0.340 [0.8399]	2.18 [0.1399]	1.55 [0.2138]	0.00 [0.9756]	2.01 [0.1564]	3.81 [0.0511]	1.71 [0.1909]	1.98 [0.1595]	2.26 [0.1324]	0.86 [0.3551]	1.04 [0.3069]	0.10 [0.7552]
Ramsey test	1.78 [0.2151]	3.64 [0.0724]	4.04 [0.0583]	0.63 [0.6139]	0.36 [0.7849]	0.44 [0.7368]	5.46 [0.0245]	39.16 [0.0001]	36.85 [0.0001]	1.05 [0.4456]	1.17 [0.4092]	0.47 [0.71130]

Notes: *** p<0.01, **p<0.05, and *p<0.1. Value in () are t-statistics of estimates. Value in [] are p-values of diagnostics tests.