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CAUSALITY BETWEEN ECONOMIC GROWTH AND TOURISM EXPANSION: EMPIRICAL EVIDENCE FROM TRENTINO-ALTO ADIGE

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This paper investigates the causal relations between tourism growth, relative prices and economic expansion for the Trentino-Alto Adige/Südtirol, a region of northeast Italy bordering on Switzerland and Austria. Johansen cointegration analysis shows the existence of one cointegrated vector among real GDP, tourism and relative prices where the corresponding elasticities are positive. Tourism and relative prices are weakly exogenous to real GDP. A variation of the Granger Causality test developed by Toda and Yamamoto is performed to reveal the uni-directional causality from tourism to real GDP. Impulse response analysis shows that a shock in tourism expenditure produces a fast positive effect on growth

Keywords: *economic growth; tourism expenditure; Johansen cointegration test; Granger causality; Trentino- Alto Adige.*

JEL Classification: *L83, M1, O1*

INTRODUCTION

International tourism, on which we focus in this paper, is recognized to contribute to long-run growth through diverse channels. This belief that tourism can promote, if not, plainly, cause long-run economic growth is known in the literature as the Tourism-Led Growth Hypothesis (TLGH). Since Shan and Wilson (2001) proposed TLGH, several remarkable researches suggesting the validity of this hypothesis appeared as Balaguer and Cantavella (2002) and Cortez -Jimenez and Paulina (2006) for Spain;

Dritsakis (2004) for Greece; Gunduz & Hatemi-J (2005) and Katircioglu (2008) for Turkey; Louca (2006), Noriko & Motosugu (2007), and Gani (1998) for small islands; Eugenio-Martín et al. (2004) for high and medium income Latin American Countries; Oh (2005) for Korea and Kim et al. (2006) for Taiwan. Similarly, Proença and Soukiazis (2005) denote unidirectional causality from tourism to growth in Portuguese regions, Brida et al. (2008) for Mexico, Gahli (1976) for Hawaii, and Fayissa et al. (2007) for 42 African countries. Bidirectional causality was demonstrated by Cortez-Jimenez & Paulina (2006) for Italy, Durbarry (2004) for Mauritius and Shan & Wilson (2001) for China. As Lanza et al. (2003), Lee & Chang (2008) pointed the unidirectional causality from tourism to growth for OECD countries, as well αs bidirectional for non OECD ones.

This study seeks to contribute to resolve the questions on the TLGH in the region of Trentino-Alto Adige region of Italy by testing a cointegration, constructing a Vector Autoregression (VAR) model and consequently, setting up a long-run effect of these variables (that is, tourism, relative prices and economic growth) for the Trentino-Alto Adige region. The hypothesis is tested empirically by using the cointegration test by Johansen (1988), Johansen and Joselius (1990) and Johansen (1995). Granger Causality test is not recommendable when there is a cointegration relationship, in so far, the Toda and Yamamoto (1995) modified version of the Granger Causality test (Granger, 1988) is applied.

The paper is organized as follows. In the next section we describe the data of Trentino Alto Adige region considered for the research and the main characteristics of these variables. Section 3 introduces the model specification. In Sections 4 and 5 the results from the empirical analysis and the comparisons with other researches are presented. Finally, Section 6 presents the concluding discussion and further comments.

DATA AND METHODOLOGY

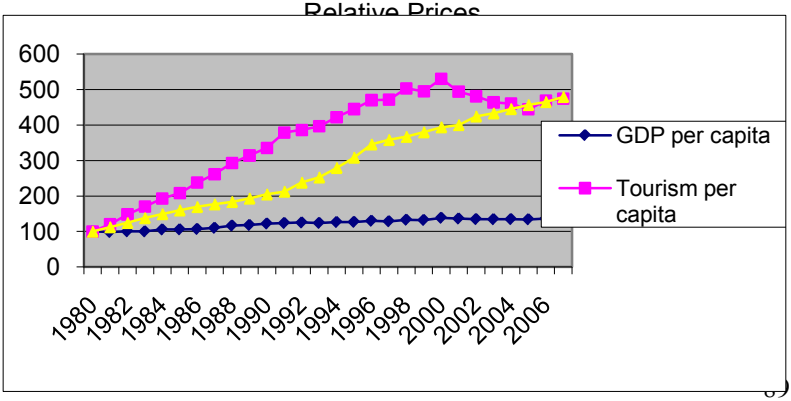
The tourism sector is very relevant to explain develop in Trentino Alto Adige region. Similarly with the levels of world's GDP data provided by World Travel and Tourism Council, tourism in the region represents a 10% of the GDP. Trentino Alto Adige has become the Italian region with more tourism investment during the last 40 years. This could be explained by two reasons. On the one hand the strong support of public investment, subsidies and promotional activities by the government of the province could have generated this growth in tourism. On the other hand the shock in tourism could have generated a fast growth of the region economy. Moreover, considering than 60% of the guests in the region are

Germans and 20% are Italians (ASTAT (2008)) the importance of the relative prices could affect the decision of doing tourism in Trentino Alto Adige. Furthermore, there is a regional policy to encourage promotional activities on German markets.

In this study the GDP of Trentino-Alto Adige is used to measure the value of economic growth (Bodie, Alex, and Alan (2001)). Annual time series of GDP (y) were constructed based on ISTAT information concerning the growth rate of GDP from 1980 to 2000 (constant prices of 1995) meanwhile time series from 2000 to 2006 (constant prices 2006) were provided by ASTAT. The variable of Tourism (tt) was obtained from Earning of Tourism, proxy by Hotel and Restaurants, series at constant prices of 2000 from 2000 to 2006 adjusted by series of Commerce, Hotels and Restaurants at prices of 1995 from 1980 and 2000; and Services at prices of 2000 for the year 2007. Relative prices (p) between Trentino-Alto Adige and Germany are considered as a proxy variable of external competitiveness, obtained by Prices of a single room in Alto Adige from 1988-2006 provided by the Institute for Economic Research of the Chamber of Commerce, Industry and Agriculture of Bolzano, adjusted by Consumer Prices Index of Italy 1980-1988, divided by the Consumer Prices in Germany (IMF).

Considering GDP per capita, tourism expenses per capita and relative prices in Trentino Alto Adige region (taking as base 1980) the last two have almost the same growth performance. Figure 1 show that after 2000 tourism per capita decrease meanwhile GDP per capita is stable. This evolution of Tourism and Relative Prices could suggest that the increase of tourism have generated inflation in the region and then this point is relevant to study also causality.

Figure 1. Evolution of GDP per capita, Tourism per capita and Relative Prices



MODEL SPECIFICATION

To test the causality between the variables we specify a Vector Auto Regressive (VAR):

$$U = (Ln\ y, Ln\ tt, Ln\ p) \qquad (1)$$

The main purpose is to search long-run relationship among the three variables, but a Vector Error Correction model is applied to model the short-run dynamics. Firstly, unit root test are applied to study the stationarity of the series. When the variables of interest are non-stationary or exhibit a unit root, the procedures of conventional econometric technique may not be appropriate (Engle and Granger (1987); Enders (1995)). Granger and Newbold (1974) pointed out that in the presence of non-stationary variables, an OLS regression might become a spurious regression, thereby leading to biased and meaningless results. In growing economies economic time-series data are likely to be non-stationary. Therefore, prior to testing a long-run equilibrium relationship between tourism expansion and economic growth, the Augmented Dickey–Fuller (Dickey and Fuller (1981)) test is used to examine the presence of a unit root for all the study variables, meanwhile the KPSS test that has the null hypothesis of stationarity, would test the contrary hypothesis. In case of non-stationarity we apply the Johansen cointegration test in order to detect long-run relationships in the data. The two-step procedure by Engle and Granger (1987) assumes the existence of only one cointegrating relationship. The general procedure proposed by Johansen (1988) has the advantage of testing all the possible cointegrating relationships. Then weak exogenity is tested in the model. Finally, Toda and Yamamoto causality test is applied in order to analyze causality between the variables. Engle and Granger (1987) and Granger (1988) noted that if two time-series variables are cointegrated, then at least one -directional Granger-causation exists. The existence of a stable long-run relationship (cointegrating relationship) between economic growth and tourism expansion implies that the two variables are causally related at least in one direction. As final step, to answer the question regarding the direction of causation, the Granger causality tests were performed: Since two series of economic growth and tourism expansion are cointegrated of order (1,1), a VAR model can be constructed in terms of the levels of the data (Engle and Granger (1987)).

EMPIRICAL RESULTS

A first step in cointegration analysis is to check the stationarity of the series considering that regressions could produce significant OLS parameter and high R-square but the residuals could be non-stationary.

To analyze the stationarity of the series two complementary unit root tests are implemented: the Augmented Dickey-Fuller (ADF) with null hypothesis of nonstationarity and the KPSS that has the null hypothesis of stationarity. According to the results in tables 1 and 2 (unit root tests for the variables in levels and in differences) time series are integrated processes of first order, I(1). Hence, we have to study the existence of a cointegrating relationship.

Table 1. Unit rooth test result: Level

Variable	Lny		Lntt		Lnp	
Unit Root Test	ADF	KPSS	ADF	KPSS	ADF	KPSS
Constant	-1.52	0.62	-8.28*	0.61	-4.11*	0.67
Trend, Constant	-0.93	0.17	-2.78	0.18	-0.71	0.15
Without Trend, Const.	-3.1*	-	0.88	-	-12.2*	-

** Null Hypothesis Rejection at 5%*

Table 2. Unit rooth test result: First difference

Variable	Δ Lny		Δ Lntt		Δ Lnp	
Unit Root Test	ADF	KPSS	ADF	KPSS	ADF	KPSS
Constant	6.24*	0.28*	-2.62	0.7	-2.86	0.45*
Trend, Constant	-7.18*	0.08*	-5.16*	0.13*	-3.44	0.072 *
Without Trend, Const.	-1.66	-	-2.82*	-	-1.63	-

** Null Hypothesis Rejection at 5%*

Following Banerjee et al. (1993), searching for cointegration is searching for a statistical equilibrium between variables tending to grow over time. In so far, a second step is to model the discrepancy of this equilibrium by a Vector Error Correction (VEC) model. The VEC shows

how the variables come back to the equilibrium after suffering a shock. In order to obtain the optimal VEC model we applied the minimum AIC-criterion, suggesting a lag length of two. To determine the number of cointegrating equations, the Johansen maximum likelihood method provides both trace and maximum eigenvalue statistics. Note in Table 3 that trace test detect the existence of one cointegrating vector at 5% level.

A third analysis to avoid inference problems is to check the weak exogeneity of the model in order to prevent incorrect signs (McCallum (1984)). Considering separately the weak exogeneity of the variables, we observe that tourism expenditure is exogenous. Table 4 presents the joint hypothesis of exogeneity for Lntt and Lnp ($\alpha 2=\alpha 3=0$). The test indicates a test statistic of 0,836 and the hypothesis of weak exogeneity cannot be rejected at 5% level (note p-value = 0.65).

Table 3. Unrestricted Cointegration Rank Test

Trend Assumption: No deterministic trend
Series: Real GDP, Tourism, Relative Prices

Hypothesized No. of CE	Eigenvalue	Trace Stat.	0.05 Critical Value	Prob.**
None*	0.559	37.72	35.19	0.026
At most 1	0.347	17.24	20.26	0.124
At most 2	0.23	6.55	9.16	0.153

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* Denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values

Table 4. Weakly exogeneity test

Cointegrating Restrictions: H0: A(2,1)=0, A(3,1)=0
Restrictions identify all cointegrating vectors; LR test for biding restrictions (rank=1)
Chi-square(2): 0,836; p-value: 0,65>0,05

Cointegrating Vector after exogeneity

Lny	Lntt	Lnp	constant
1	-0.246	-0.017	-5.469
t-statistics	[-7.68]	[-0,52]	[19.89]

A(2,1) and A(3,1) are the adjustment coefficients in the Lntt and

Lnp equations of the VEC, respectively.

Cointegration by itself does not indicate the direction of the causal relationship. Granger (1988) proposed a test to study causality, that can be captured from the VAR model, but since variables are integrated it application is invalid. Toda and Yamamoto (1995) suggest an alternative procedure, estimating VAR model with (k+dmax) lags, where k is the standard optimal number of lags and dmax is the maximal order of integration that we suspect might occur in the process. Considering the estimated VAR we test Granger causality only using the first k lags. In this case we test with 3 lags (k= 2 the optimum lag level and dmax= 1 optimum number of serial integration with a unit root)

If we consider the following equation from VAR model:

$$Lny_t = \beta_0 + \beta_1 Lny_{-1} + \beta_2 Lny_{-2} + \beta_3 Lny_{-3} + \beta_4 Lntt_{-1} + \beta_5 Lntt_{-2} + \beta_6 Lntt_{-3} + \beta_7 Lnp_{-1} + \beta_8 Lnp_{-2} + \beta_9 Lnp_{-3} + \beta_{10} \quad (2)$$

The null hypothesis of non-causality from Tourism to GDP should be H0: $\beta 4 = \beta 5 = 0$. This hypothesis is tested using Wald test2.

Table 5 shows the results for all the variables.

Table 5. Granger Causality Test

Null hypothesis	F-statistic	p-value
Tourism does not Granger Cause Growth	6,826	0.033*
Growth does not Granger Cause Tourism	1,511	0,469
Prices does not Granger Cause Growth	3,249	0,197
Growth does not Granger Cause Prices	4,746	0,093
Prices does not Granger Cause Tourism	0,209	0.9
Tourism does not Granger Cause Prices	2,486	0,288

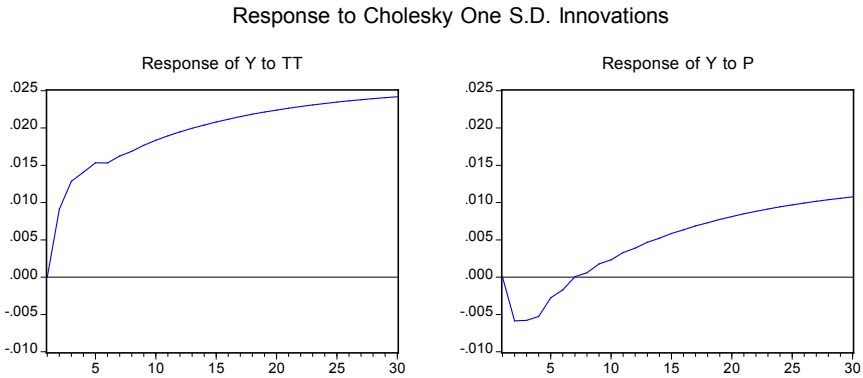
** Indicates rejection of the null hypothesis at 5%.*

The following Equation 3 shows the long-run equilibrium after testing weak erogeneity of tourism and relative prices:

$$Lny = 0.223462\ (Lntt) + 0.029182\ (Lnp) - 5{,}2874 \quad (3)$$

Summarizing, tourism and relative prices are weakly exogenous and in the long-run, tourism Granger-cause real GDP of Trentino-Alto Adige and an increase in tourism demand by 100% produces an increment of 22% of the real product of the region. Moreover, as it is shown in the below impulse-response figure 2, after a shock in the number of foreign tourists real GDP in Trentino-Alto Adige there is a continuous growth, meanwhile present a initial contraction and then a growth in case of relative price shock. In this figure is pointed out the effect of a shock in tourism and relative prices over the Trentino-Alto Adige economy growth. Meanwhile a shock in relative prices show a J-curve shape (Magee, 1973) producing first a negative response (real devaluation) for seven quarters and then a positive reaction on the real GDP, a shock in tourism positively affects the long-run real GDP.

Figure 2. Impulse Response Functions of GDP



COMPARING RESULTS

In comparison with the papers mentioned in the introduction that support TLGH, we can remark for this study, that there is a unidirectional causality as in the following researchs: Balaguer and Cantavella (2002) for Spain, Brida et al.(2008) for Mexico, Eugenio-Martín et al. (2004) for high and medium income Latin American Countries, Gunduz and Hatemi-J (2005) for Turkey, Lanza et al.(2003) and Lee and Chang (2008) for OECD countries, Noriko and Motosugu (2007) for the Amami islands and Proença and Soukiazis (2005) for Portugal. Moreover, we obtained Granger causal relationship between tourism and economic growth.

There is a cointegration relationship between the three variables, and affects positively economic growth. The corresponding elasticity of tourism demand has a significant effect on economic growth (22%). That provides the necessary arguments to support TLGH for Trentino-Alto Adige. In comparing the Trentino-Alto Adige elasticity of 0.22, that is higher than the old-tourism economies (as Spain-0.06, Italy-0.08 and Portugal- 0.01) and below the higher tourism potential countries (as Mexico-0.67 or Mauritius 0.77), we can consider that the region is in the average of the developed economies. Moreover, whereas the response of a shock in prices would generate a J-curve shape, in comparison with higher tourism potential countries, there is not causality from the relative prices to the economic growth.

CONCLUSIONS

This paper shows that international tourism expenditure positively impacts Trentino-Alto Adige economy. The elasticity of real GDP to tourism expenditure (0,22) shows that an increment of 100% in the tourism expenditure produces an increment of almost 22% of the real product. However relative prices produce positive but low effect (0.03). The results indicate that the TLGH is empirically supported for the Trentino-Alto Adige economy.

Causality testing shows that the number of international tourists visiting South Tyrol and the relative prices between Trentino Alto Adige and Germany are weakly exogenous and that, in the long-run, they Granger-cause real GDP. In conclusion, enthusiastic tourist-attracting policies as a means of economic development may be effective, and tourism policies to stimulate new tourism demand should be essential to take Trentino-Alto Adige from an average to a higher tourism potential region. In this way the effect of relative prices could take more relevance over the real GDP.

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ENDNOTES

1. Granger causality test uses the LR test to contrast the null hypothesis. However, as Toda and Yamamoto (1995) point out that Wald and LR test are asymptotically equivalent, so, is correct to test the hypothesis with Wald test.

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