INCOME AND PRICE ELASTICITIES OF THE ITALIAN EXPORTS IN TOURISM SERVICES

1. Introduction

Tourism is a dynamic and growing industry: its contribution to the balance of payments, GDP and the labour market is relevant. In 2008, international tourism receipts totalled 942 billion US$ – about 2.6 billion US$ a day (World Tourism Barometer, 2010). The sector represents around 35% of the world's exports of services and over 70% of those in the least developed countries. Since the first half of 2009, however, the sector has been undergoing a period of slowing performances due to the impact of the global economic recession (World Tourism Barometer, 2010).

Mainly dominated by small-medium enterprises, tourism accounts for more than 5% of the European Union's GDP, with about two million enterprises employing about 5% of the total labour force and comprising approximately nine million jobs. When the linkages to other sectors are considered, the contribution of tourism to GDP increases to about 11% and the employment rate reaches about 12%, creating 24 million jobs (European Commission, 2010).

Besides economic growth and jobs creation, tourism plays an important role in fostering the development of the vast majority of European regions. Infrastructure built for tourism reasons contributes to local development, and jobs are created or preserved even in areas suffering industrial or rural decline or experiencing urban regeneration (European Commission, 2007).

Within the Euro Area, Italy is one of the leading tourism destinations. According to the World Travel and Tourism Council (WTTC, 2010), Italy's travel and tourism has generated US$280.67 billion of economic activity in 2007 and US$296.65 billion in 2008, these values are expected to grow (in nominal terms) to US$365 billion by 2016. Further, the direct and indirect impact of the Italian travel and tourism economy has accounted for 9.77% of Italy's GDP in 2007 and it has produced 2,651,000 jobs (11.53% of total employment) in the same period (WTTC, 2009). The number of workers in the travel and tourism sector has dropped to 2,582,400 and 2,541,000 in 2008 and 2009 (WTTC, 2010).

Notwithstanding the importance of tourism on the Italian balance of payments, no articles – to our knowledge – have been found on the analysis of the export equation of the Italian tourism services. Empirical research has been instead carried out on the Italian tourism demand (Barucci and Becheri, 1990; Formica and Uysal, 1996) and the links between international tourism and economic growth (Cortés-Jiménez, 2008; Federici and Marconi, 2002). Given the relevance of services on the current account surplus and deficit of a certain country, the present study aims at evaluating the responsiveness of tourism export flows to price competitiveness changes by estimating, as precisely as possible, a number of key elasticities. The estimations of price and income elasticities are important, because they can be applied to many relevant macro-economic issues: the effect of both monetary and fiscal policies and expenditure switching policies (such as exchange rate, subsidies) on a country's balance of payments, the international transmission of changes in economic activity and price, the international competitiveness in services among countries. Another contribution regards the adoption of the imperfect substitute model to assess the determinants of trade in tourism services. The remainder of the paper is organised as follows. Section 2 gives an overview of the current tourism market in Italy. Section 3 briefly reviews the economic literature. Section 4 and 5 present the Cointegrated Vector Autoregressive model adopted for the analysis of the demand for Italian exports of tourism and offers empirical evidence *vis-à-vis* the 1990-2007 period. Section 6 concludes.

2. The Italian tourism market

The role of tourism in the Italian economy is significant. The value generated directly and indirectly by the sector was 60.6 billion Euros in 2009, 47.5% (28.8 billion Euros) of which was generated by the Italian exports of tourism services. Throughout the same year, tourism accounted for 4% of the total national value added (WTTC, 2010).

The importance of the Italian tourism in an international context is showed in Table 1. In 2007, Italy was visited by 43.7 million foreigners, ranking it fifth worldwide in terms of tourist arrivals, after France, the USA, Spain and China. The ranking remained unchanged in 2008 and 2009. It is worthwhile noting that in 2006 Italy registered the highest positive percentage variation in terms of number of visitors (12.4%) among the most prestigious tourist destinations, this value soared by 6.3% in 2007 and by 1.2% in 2009. The only negative percentage variation was registered in 2008 (-2.1%) (Table 1, Appendix). In terms of international tourism receipts, Italy ranked fourth in the world with US$40.2 billion in 2009, after the USA (US$94.2 billion), Spain (US$53.2 billion) and France (US$48.7 billion) (World Tourism Barometer, 2010). Most of the Italian tourism revenues are generated from German, American, French, English and Swiss tourists (Figure 1, Appendix). In the same year, there were 4,649,050 tourist beds in Italy, distributed across 140,263 tourism establishments. Hotels accounted for 67.3% of the nights spent, camping and holiday resorts for 17.4%, tourist apartments for 8.9%, and agri-tourism for 2.3%. The remaining visitors opted for other types of non-hotel accommodation (ISTAT, 2010a).

Since the mid-1990s, the number of nights spent in three-four-star hotels has increased, reflecting, among other things, the growing importance of conference tourism and the trend toward 'quality tourism'. Weekend trips and city breaks have grown in popularity, while niche travel (such as eco-tourism, gastronomy-tourism and adventure trips) is likely to be one of the sector's growth areas in coming years.

According to the Italian National Institute of Statistics (ISTAT, 2010 b), the key Italian regions to attract worldwide tourists are Lazio, Emilia Romagna, Tuscany, Lombardy and Veneto. Combined, these regions produce more than 68% of the total value-added tourism of the country, and the main cities to generate tourism returns are Rome, Venice, Florence and Naples. The average foreign tourist spends about 126 Euros per day, 46.7% of which is due to accommodation costs, 22% to eating and 17% to shopping (Turismo e Finanza, 2008).

Tourism flows are concentrated mainly during the summertime period, during which Italy records its highest volume of tourist receipts. This strong seasonality between June and September is mainly caused by the predominance of 'sun and sea' tourism, with about 75% of Italians and 36% of foreigners[1] preferring this kind of tourism (Turismo e Finanza, 2007).

[1] About 60% of foreigners prefer tourism in cities where art is featured.

3. Trade modelling

Substantial empirical literature exists on the estimation of price and income elasticities in international trade of goods, a dearth of research has been carried out for services. Services and goods differ in nature. Differently from goods, the production and delivery of services coincide. Further, services have an intangible nature. From here the question of how the time series behaviour of exports and imports in service should be modelled becomes crucial. The appropriate model relies on: the type of traded service, i.e. if it is tourism, financial service, technological service etc.; the main purpose to which the traded service is destined; the institutional and legal structure under which trade takes place; the aim of the modelling analysis, i.e. if it is necessary to forecast or to test hypotheses; and the availability of data, i.e. if data are annual or quarterly or if they are disaggregated or aggregated. Previous researches have generally focused on total trade in services, the present paper examines the sector in a more disaggregated way concentrating the attention on one of its most important component, tourism. The theoretical foundation of the empirical analysis is the Imperfect Substitutes Model, because the typical market for tourism services is monopolistic competition. This is chiefly true for destinations, such as Italy, which depend on a significant abundance of natural and cultural resources. The awareness that tourism services are not coherent with a perfect competition model and that Italian tourism services are sensitive to price competitiveness (and worldwide changes in global income), are implied in an imperfect substitute model. The basic assumption of this model is that neither imports nor exports are perfect substitutes for domestic products and services. Such an hypothesis is confirmed by empirical evidence. If domestic and foreign goods and services were perfect substitutes, a given country would be either an exporter or an importer. Since the world market is characterised by the presence of bilateral trade and the coexistence between imports and domestic production in goods and services, the hypothesis of perfect substitution can be rejected. Moreover, a large body of empirical studies (Lipsey, 1978; Kravis and Lipsey, 1983; Giovannini, 1988; Wolf *et al*., 1994; Wolf and Haskel, 2000) have shown that price differentials can be surprisingly large for the same product in different countries. It seems therefore, that finite price elasticities of demand and supply (as the imperfect substitutes models postulates) can in fact be estimated for most traded goods and services.

The imperfect substitutes model (Goldstein and Khan, 1985; Marquez and McNeilly, 1988; Hooper *et al*., 2000; Algieri, 2004;

Marquez, 2006) of the home country's exports to, and imports from, the rest of the world (*) is formalized by a set of equations:

$M^d = \gamma\ (Y,\ P^M,\ P,)$ $\qquad \gamma_1,\ \gamma_3 > 0,\ \gamma_2 < 0$ (1)

$X^d = \pi(Y^*e,\ P^X,\ P^*e)$ $\qquad \varpi_1,\ \varpi_3 > 0,\ \varpi_2 < 0$ (2)

$M^s = \varphi(\ P^{M^*}\ (1+S^*),\ P^*)$ $\qquad \varphi_1 > 0,\ \varphi_2 < 0$ (3)

$X^s = \xi(P^X\ (1+S),\ P)$ $\qquad \xi_1 > 0,\ \xi_2 < 0$ (4)

$P^M = P^{X^*}\ (1+T)e$ (5)

$P^{M^*} = P^X\ (1+T^*)/e$ (6)

$M^d = M^s e$ (7)

$X^d = X^s$ (8)

The eight equations identify the quantities of imports demanded by the home country (M^d), the quantity of exports demanded by the world from the home country (X^d), the quantity of imports supplied by the rest of the world to the home country (M^s), the quantity of the home country exports to the rest of the world (X^s), the prices in domestic currency paid by the importers (P^M and P^{M^*}) and the prices in domestic currency paid to the exporters (P^X and P^{X^*}). The level of nominal income (Y, Y*), the prices of domestic commodities produced within the regions (P, P*), proportional tariffs (T, T*), subsides to imports and exports (S, S*) and the real exchange rate (e) are the explanatory variables.

The main features of the imperfect substitutes model can be summed up as follows. Along with the standard demand theory, it is supposed that the representative agent maximises his lifetime utility subject to a lifetime budget constraint. The resulting demand functions for exports and imports of goods and services therefore, describe the quantity demanded as a function of the level of monetary income in the importing country, the imported product's own price, and the price of domestic substitutes. By considering a logarithmic utility function, the income (γ_1 and ϖ_1) and price elasticity (γ_3 and ϖ_3) of substitutes are assumed to be positive, while the price elasticity of the traded product is assumed to be negative (γ_2 and ϖ_2).

Let us assume the demand function to be homogeneous of degree 0, equation 1 can be written in the following way:

$$M^d = \gamma\ (Y/P\ ,\ P^M/P) \qquad \gamma'_1 > 0,\ \ \gamma'_2 < 0$$

where Y/P = real income

P^M/P = real import price

Considering an n-country model, the symmetry between the demand function for imports and the demand function for exports vanishes. Imports compete, in fact, only with goods and services produced within the country. Exports compete both with goods and services produced in the imported country and with exported goods by third countries. Equation 2 is corrected with prices of competing goods and services:

$$X^d / X_*^d = \pi \ (P^* X^d / P^* X_*^d)$$

where X_*^d is the demand for exports to the rest of the world from third countries.

The supply functions depend on the prices of exported and domestic goods and services and on subsidies. The price elasticities of exported and local commodities (φ_1 and ξ_1) are assumed to be positive, the price elasticities of substitutes (φ_2 and ξ_2) are supposed to be negative. The equilibrium conditions are represented by the last two equations. The implicit hypothesis is that prices move in order to equate demand and supply over time.

The imperfect substitutes model, by presenting both demand and supply side equations, allows to identify simultaneous relationships among quantities and prices. In spite of this peculiar characteristic, brilliantly pointed out by Orcutt (1950) and Goldstein and Kahn (1985), a host of time series works on export and import equations have considered the supply side only by assumption. Throughout the early 90s, the standard methodology to estimate import and export demand [eq. (1) and eq. (2)] was based on the assumption of an infinite supply-price elasticity for imports and exports [φ_1 in eq. (3) and ξ_1 in eq. (4)]. Under this hypothesis, P^M and P^X were viewed as exogenous and thus estimated by single equations. If the supply elasticities were instead, less than infinite, the problem would be more cumbersome because one should either appraise the complete structural system of simultaneous equations or solve the reduced form for quantities and prices as functions of the exogenous variables in the system. After 1995, economic researchers have used either cointegration analyses to cope with simultaneity problems or fully-modified-OLS methodologies to overcome endogeneity and serial correlation biases.

4. Deriving the demand for Italian exports of tourism

Let us suppose that Italy (the exporting country) has only one trading partner (the rest of the world). Italy's export demand of service (x_t) will hence coincide with the import demand of the rest of the world (m_t*). We continue to assume that there is a representative agent in the rest of the world, who lives forever and maximises his utility by choosing how much to consume of his domestic endowment (w_t*) and of the imported service (m_t*) e.g. tourism. The representative consumer in the rest of the world maximises an inter-temporal utility function over time (U_t) expressed as:

$$\underset{\{w_t^*, m_t^*\}_{t=0}^{\infty}}{Max} \; U_t = \underset{\{w_t^*, m_t^*\}_{t=0}^{\infty}}{Max} \; E_t \cdot \left\{ \sum_{t=0}^{\infty} (1+\delta)^{-1} \cdot u(w_t^*, m_t^*) \right\} \tag{9}$$

subject to his budget constraint:

$$b_{t+1}^* = (1+r) \cdot b_t^* + (s_t^* - w_t^*) - p_t \cdot m_t^* \tag{10}$$

and to a transversality condition, which excludes Ponzi-games, i.e. the fact that a consumer can freely consume all lifetime resources, by borrowing forever without extinguishing his debt:

$$\lim_{T \to \infty} \frac{b_{T+1}^*}{\prod_{t=0}^{T} (1+r)^{-1}} = 0 \tag{11}$$

All the starred variables denote the rest of the world (the importing country) while non-starred variables refer to Italy. $E\{\cdot\}$ is the expectation operator at time t; δ is the consumer's rate of time preferences, i.e. the subjective discount rate, which measures the individual's impatience to consume; agents are free to borrow and lend at the same world interest rate r, that is the yield on capital; b_{t+1}^* denotes the next period stock of Italian bonds held by the rest of the world if positive and the next period stock of foreign bonds held by Italy if negative; p_t is the price of the Italian services in terms of foreign services; s_t^* is the stochastic endowment which follows an AR(1) process of the form:

$$\begin{aligned} & s_t^* = \mu \cdot s_{t-1}^* + (1-\mu) \cdot \bar{s}^* + \varepsilon_t^* \\ & 0 \le \mu \le 1 \\ & \varepsilon_t^* \approx \left(0, \sigma^2\right) \end{aligned} \tag{12}$$

with an unconditional mean $\bar{s}^*$ and an unconditional variance $s^2/(1-m^2)$. ε_t^* is an independent and identically distributed shock to the stochastic endowment with zero mean and variance s^2. m governs the degree of persistence of the endowment shock. The first order conditions for the individual's problem are:

$$\frac{\partial L_t}{\partial w_t^*} : \; u_{w^*}(t) - \lambda_t = 0 \tag{13}$$

$$\frac{\partial L_t}{\partial m_t^*} : \; u_{m^*}(t) - \lambda_t \cdot p_t = 0 \tag{14}$$

$$\lambda_t = (1+\delta)^{-1} \cdot E_t(1+r) \cdot \lambda_{t+1} \tag{15}$$

where L is the Lagrangian and λ_t is the Lagrange multiplier associated with the budget constraint. Consider the case in which the individual utility function is of addilog type, as in Ogaki (1992) and Clarida (1994), de la Croix and Urbain (1998), Senhadji and Montenegro (1999). The specific form of the instantaneous utility function is:

$$u_t(w_t^*, m_t^*) = \frac{\Omega_t \cdot (w_t^*)^{1-\alpha}}{1-\alpha} + \frac{\Psi_t \cdot (m_t^*)^{1-\beta}}{1-\beta} \tag{16}$$

$$\Omega_t = e^{a_0 + \xi_{\Omega,t}} \tag{17}$$

$$\Psi_t = e^{b_0 + \xi_{\Psi,t}} \tag{18}$$

where Ω_t and Ψ_t are exponential stationary random shocks, which cause variations in the preferences of the representative agent, $\xi_{\Omega,t}$ and $\xi_{\Psi,t}$ are stationary shocks, α and β are called curvature parameters and their inverse can be interpreted as long-run intertemporal elasticities of substitution between the domestic and the imported services. Solving the maximization problem for the explicit utility function (16) and substituting the values for Ω_t and Ψ_t we will have the following first order conditions:

$$w_t^* = \lambda_t^{-\frac{1}{\alpha}} \cdot (e^{a_0 + \xi_{\Omega,t}})^{\frac{1}{\alpha}} \tag{19}$$

$$m_t^* = \lambda_t^{-\frac{1}{\beta}} \cdot (e^{b_0 + \xi_{\Psi,t}})^{\frac{1}{\beta}} \cdot p_t^{-\frac{1}{\beta}} \tag{20}$$

Taking the log for the equations (19) and (20), solving the equation (19) for λ and substituting it in the equation (20) yields:

$$\ln m_t^* = \frac{\alpha}{\beta} \ln w_t - \frac{1}{\beta} \ln p_t - \frac{a_0}{\beta} - \frac{\xi_{\Omega,t}}{\beta} + \frac{b_0}{\beta} + \frac{\xi_{\Psi,t}}{\beta} \tag{21}$$

posing $\phi = \frac{1}{\beta}(b_0 - a_0)$ and $\xi_t = \frac{1}{\beta}(\xi_{\Psi,t} - \xi_{\Omega t})$ leads to the standard export demand function of the economic imperfect substitutes model:

$$\ln m_t^* = \ln x_t^* = \phi + \frac{\alpha}{\beta} \ln w_t - \frac{1}{\beta} \ln p_t + \xi_t \tag{22}$$

5. Data description

To take into account the complexity of tourism price, this variable has been split into two components. The resulting extended stochastic econometric specification, which represents the demand function[2] for Italian export of tourism is expressed as follows:

$$ln\, x_t = \phi + \frac{\alpha}{\beta} ln\, w_t - \frac{1}{\beta} ln\, p_t^{tour} - \frac{1}{\gamma} ln\, p_t^{trav} + \xi_t \qquad (23)$$

where the dependent variable x_t is Italy's tourism exports in value terms; the chosen explanatory variables include income and prices variables. Explicitly, w is the income variable, p^{tour} is the relative price for tourism services and p^{trav} represents the price of travel. α/β $1/\beta$ and $1/\gamma$ are the coefficients that need to be estimated empirically, ξ is the disturbance term independently and identically distributed (i.i.d.) and subscript t stands for time. As regards the dataset, the Italian exports of tourism services (x_t) in Euros at constant prices (2000=100) were collected from the Italian Balance of Payments Statistics[3] compiled by the Italian Foreign Exchange Office (UIC)[4]. Given the high correlation between GDP growth and industrial production (BNP Paribas, 2008; Eurostat, 2007), the income variable (w_t) is expressed in terms of world industrial production (2000=100), this proxy avoids *de facto* to transform original data. Monthly data for GDP or disposable income are, in fact, not available, therefore one should convert quarterly data of GDP into monthly frequencies. The adoption of the world industrial production as measure of income is also in line with the work by Gonzàlez and Moral (1995). Income figures have been taken from OECD Main Economic Indicators. The price variable is broken down into two series: the price for tourism service (p_t^{tour}) and the price of travel to

[2] As noted in section 3, it is possible to have a demand function for export of goods and services and a supply function for exports of goods and services, as well as, a demand and a supply of aggregate imports of goods and services. See Goldstein and Khan (1985) for a thorough analysis.

[3] Tourism exports are the item 'travel, credits' of the Balance of Payments and correspond to the 'expenditure of non-resident visitors (tourists and same-day visitors)' within the economic territory of the country of reference. Tourism imports are the item 'travel, debits' of the Balance of Payments and refer to overseas payments made by the travelers of the country of reference in another visited country (United Nations, 1994).

[4] Since January 2008, the UIC has ceased to exist and its functions have been taken over by the Bank of Italy.

the destination (p_t^{trav}). The price for tourism service includes, among other items, accommodation, food, drinks, souvenirs, entertainment and local transportations. In particular, the price for tourism service index is constructed as the ratio between the Italian harmonized consumer price index (CPI) for accommodation services[5] (2000=100) and an aggregate of the accommodation service CPIs of a group of competitor countries[6], corrected by the nominal effective exchange rate. The weighting system, that adjusts over time, reflects the relative importance of each country in the world export of tourism. Put differently, the relative price index is a measure of the real effective exchange rate because it is constructed using nominal effective exchange rate and CPI measures. This index gives a clear picture of the effective price impact for foreign tourists of the Italian tourism services, as it takes inflation differentials into consideration. An upsurge in the relative price for tourism services index implies a drop in Italy's competitiveness as tourism destination and a contraction in Italian tourism exports. CPI data have been taken from the European Central Bank, Statistical Data Warehouse, data for exchange rate were extracted from OECD. The price of travel has been proxied by oil price, because airfares tend to follow oil price dynamics; specifically, it has been selected the Europe Brent spot price taken from the Energy Information Administration (2008). For all variables, monthly data seasonally adjusted[7] ranging from 1990:1 to 2007:10 have been considered. Their description is reported in Table 2, Appendix.

5.1 Integration Order of the Variables

The quantitative variables were transformed into natural logarithms, namely, the natural logarithms of (1) tourism exports (lnx), (2) the relative price for tourism service (lnp^{tour}), (3) the worldwide industrial production index (lnw) and (4) the price of travel (lnp^{trav}). The use of the logarithmic form has an added advantage,

[5] Accommodation services include hotels, boarding houses, motels, inns and establishments offering 'bed and breakfast', holiday villages and holiday.

[6] France, Spain, Greece, Croatia, Egypt and Turkey represent the main bulk of competitors.

[7] The seasonal nature of the variables was adjusted using the Census X-12 procedure.

in that the resultant coefficients are parameters that express the elasticities of the variable included. The stationarity property of the series has been analysed using the Augmented Dickey-Fuller (1979) (ADF) and Phillips-Perron (1988) (PP) unit root tests; the results are summarised in Table 3, Appendix. The lag length for each variable has been selected on the basis of the Schwarz Bayesian criterion, which chooses the appropriate lag length by trading off parsimony against reduction in the sum of the square. The PP test uses the Newey West bandwidth to select the proper lag structure. In each case, the null hypothesis is that the variable in question contains a unit root against the alternative hypothesis one, that the variable is stationary. The ADF and the PP statistics indicate that all variables are integrated of order one, i.e., the series becomes stationary after its first differentiation.

5.2 Cointegration and Johansen Methodology

Having identified the order of integration for the demand series, we use the Cointegrated Vector Autoregressive (CVAR) approach developed by Johansen (1988; 1995) to determine whether there is a long-run relationship among the various series. Johansen's methodology derives maximum likelihood estimators of the cointegrating vectors for an autoregressive process with independent errors. The reason behind using this methodology is its ability to distinguish between more than one cointegrating vector and to control for endogeneity[8].

Consider a p-dimensional vector autoregressive model, which in error correction form is given by:

$$\Delta x_t = \Pi x_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta x_{t-i} + \Phi S_t + \xi_t , \tag{24}$$

where Δ is the difference operator and x_t=(k x 1) is the vector of non-stationary I(1) variables, explicitly:

$$x_t = \left[exp_t ; w_t ; p_t^{tour} ; p_t^{trav} \right] \tag{25}$$

and:

$$\Pi = \sum_{i=1}^{p} A_i - I \qquad \text{I=a (k x k) identity matrix} \tag{26}$$

[8] See Gonzalo (1994) and Campbell and Perron (1991) for more details on the advantages of using the Johansen approach.

$$\Gamma_i = -\sum_{j=i+1}^{p} A_j \qquad \text{A=a (k x k) matrix of parameters} \tag{27}$$

The variable St contains a constant term and a time trend, and ξ is a (4 x 1) vector of Gaussian, zero mean disturbances. Γ_i are (k x k) dimensional matrices of autoregressive coefficients. The long-run matrix Π can be decomposed as the product of α and β, two (k x r) matrices each of rank r, such that $\Pi=\alpha\beta'$, where β' contains the r cointegrating vectors and α represents the adjustment parameters, which reflect the speed of adjustment of particular variables with respect to a disturbance in the equilibrium relationship. Therefore equation (2) becomes:

$$\Delta x_t = \left(\alpha\beta'\right)x_{t-p} + \sum_{i=1}^{p-1}\Gamma_i \Delta x_{t-i} + \Phi S_t + \xi_t \tag{28}$$

The maximum likelihood approach makes possible to test the hypothesis of r cointegrating relations among the elements of x_t,

$$H_0 : \Pi = \alpha\beta' \tag{29}$$

where the null of no cointegration relation (r=0) implies $\Pi=0$. If Π is of rank k, the vector process is stationary. If *rank* (Π)=1 there is a cointegrating vector, for other cases in which $1<$*rank* (Π)$<k$ there are multiple cointegrating vectors. Johansen's approach maximises the likelihood function for x_t, conditional to a given β, adopting standard least square formula for the regression of Δx_t on the lagged differences $\Delta x_{t-1}\ldots\Delta x_{t-p+1}$ and $\beta' x_{t-p+1}$.

Johansen's method performs better than other estimation methods – even when the errors are non-normal distributed or when the dynamics are unknown and the model is over-parameterised – by including additional lags (Gonzalo, 1994).

5.3 Empirical Results

To identify the appropriate model, the five possibilities considered by Johansen (1995) were tested, specifically: (1) the series have no deterministic trends and the cointegrating equations do not have intercepts, (2) the series have no deterministic trends and the cointegrating equations have intercepts, (3) the series have linear trends but the cointegrating equations have only intercepts, (4) both series and the cointegrating equations have linear trends, and (5) the series have quadratic trends and the cointegrating equations have linear trends. In our case, a constant and a linear trend best describe the data; hence, the fourth specification was selected. Note that the trend variable acts as a proxy for missing variables outside the information set, such as tourist tastes and preferences.

The lag length was chosen on the basis of the Aikaike Information criterion (Judge *et al*., 1988), namely, a 12-lag structure minimises the information criteria; therefore, this length was considered.

The results of Johansen's test for cointegration are reported in Table 4, Appendix. The table shows the trace and the max eigenvalue statistics. The trace statistic of r cointegration relations is a sequence of likelihood ratio tests, computed as $\lambda_{trace}(r) = -T\sum_{i=r+1}^{k}\log(1-\hat{\lambda}_i)$, where λ_i is the estimated value of the characteristic roots (also called eigenvalue) obtained from the estimated long-run Π matrix[9] and T is the number of usable observations.

The first row of the trace statistic tests the hypothesis of no cointegration, the second row tests the hypothesis of one cointegrating relation, the third row tests the hypothesis of two cointegrating relations, and so on, all against the alternative hypothesis of full rank (that is, all series in the VAR are stationary). Since the values 100.16 and 47.75 exceed the 5% critical value of the λ_{trace} statistic, the null hypotheses of non-cointegration first and r=1 can be rejected. Therefore, λ_{trace} indicates that there are two cointegration equations at the 5% significance level. Note that the critical values for the trace statistic in Table 4 are those reported by MacKinnon *et al*. (1999), not those tabulated by Johansen and Juselius (1990).

To verify the previous findings, the $\lambda_{max\ eigenvalue}$ statistics have been computed. The latter is calculated as $\lambda_{max}=-T\ \log(1-\hat{\lambda}_{r+1})$. The obtained results depart from the trace test findings: the null hypothesis of no cointegrating vector (r=0) can be rejected at the 5% level, while the null of r=1 cannot be rejected at all. λ_{max} thus shows that there is one cointegrating equation at the 5% significance level. This disagreement is not uncommon in presence of small samples (De Mello and Nell, 2005) and in this circumstance, the theory suggests to choose the statistics that maximise the SBC. In this specific case, the maximization gives support to the choice of r=1, i.e. there is evidence of one cointegrating vector. The estimation of the VEC model is carried out in two steps. In the first step, the normalised cointegrating relation from the Johansen procedure which

[9] For a detailed description of the testing procedure, see Johansen (1995).

expresses the long-run equilibrium state is estimated. Specifically, the long-run equation is expressed as:

$$ln\ x_t = 9.09 + 1.85 ln\ w_t - 2.14 ln\ p_t^{tour} - 0.057 ln\ p_t^{trav} + 0.004 trend \quad (30)$$
$$(8.82) \qquad (-3.83) \qquad (-6.06) \qquad (2.68)$$

with absolute asymptotic t-ratios in brackets. The equation includes a constant and a deterministic trend, which measures the preferences of tourists and the popularity of the destination.

Then the error correction term is computed from the estimated cointegrating relation and a VAR in first differences including the error correction term as regressor is estimated. In particular, the coefficients on the lagged first difference terms are the short-run parameters, while the coefficient D(lnx) measures the speed of adjustment towards the equilibrium.

Adjustment coefficients
(standard error in parentheses)

D(ln x)	-0.602810
	(0.12572)
D(ln w)	0.114659
	(0.04877)
D(ln p^{tour})	-0.452303
	(0.13205)
D(ln p^{trav})	-3.054670
	(0.98305)

*R*2=60.53
DW=1.98
SE=0.051
AIK=–22.39
Determinant residual covariance=5.22E-17

The results are satisfactory, the error correction term has the corrected sign and the speed of adjustment coefficient has an absolute value of 0.60, indicating a fast correction of actual exports to its long run equilibrium.

The model has been validated using a variety of residual diagnostics. Table 5 (Appendix) reports the Lagrange-multiplier (LM) test for serial correlation in the disturbances up to the order of 14. The test statistic for lag order *h* is computed by running an auxiliary regression of the residuals ξ_t on the original right-hand regressors and the lagged residual ξ_{t-h} (Johansen, 1995, p. 22). Under the null hypothesis of no serial correlation of order *h*, the LM statistic is asymptotically distributed χ^2 with k^2 degrees of freedom. The probability values indicate that the null hypothesis of no serial correlation is not rejected; therefore, there are no serial correlation problems. To verify the normality of the residuals, the multivariate extension of the Jarque-Bera residual normality test was computed. Specifically, this compares the third and fourth moments of the residuals to those from the normal distribution (Table 6, Appendix). Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as χ^2, with two degrees of freedom. With a joint probability equal to 0.54, the null is not rejected. The skewness coefficients of about zero and the kurtosis of about 3 validate that the residuals are normally distributed.

The stability of the regression coefficients is evaluated using the stability condition check as developed by Lütkepohl (1991). The regression equation appears stable, given that all roots have moduli of less than one and lie inside the unit circle. The presence of structural breaks has been tested using the Chow test (1960). It turns out that no structural break has occurred as a consequence of the terrorist attacks of 11 September 2001. To finally assess the appropriateness of the functional form of the model and to check for eventual omitted variables, the Ramsey reset test (1969) was used (Table 7, Appendix). The F-values are small and their corresponding p-values of 0.218 and 0.209 are higher than the conventional significance level of 5%. The reset test, therefore, indicates no evidence to suggest that the null hypothesis of adequate model specification should be rejected.

5.4 Discussion of Results

In line with the literature, price of tourism services, price of travel and world income are highly significant and enter the final equation with the expected signs. A rise in world income gives rise to higher tourism export receipts, whilst an upsurge in the relative price of tourism services and in the price of travel cause a drop in the Italian tourism export revenues. The estimated income elasticity (1.85), since it exceeds unity, shows that foreign tourism is regarded as a 'luxury'. Economic theory, in fact, considers foreign holidays 'superior' goods, and thus an increase in income is expected to increase demand for exports. The elasticity of 1.85 is within the range of income measures (i.e., 0.4-6.6) reported in the survey by Witt and Witt (1995). The coefficients of the price of tourism and price of travel are negative. In particular, a 1% increase in the relative price index induces a fall in exports by 2.14%. An increase in oil price of 1% reduces exports by 0.05%. The coefficient of the relative price index should be interpreted as an indicator of competitiveness, such that if strong competition from alternative destinations is overcome, the payoff can be significant. A real appreciation makes Italian destinations less competitive and attractive for tourists and lessens exports. The estimated price elasticity falls within the range of exchange measures (i.e., 0.637-2.258) reported by Witt and Witt (1995). The impact of price of travel is not as relevant, likely due to the fact that higher oil prices experienced in recent years have been absorbed by the market and have had only a marginal effect on the exports of tourism services. This is in line with a recent work conducted by UNWTO (2007). Finally, the deterministic trend signals that a change in preferences positively affects tourist exports.

The results indicate hence that the relative price of tourism services is the major factor that drives tourism export revenues in Italy, income and price of travel have lower elasticities.

The overall predictive power of the regression is satisfactory, and the diagnostic tests reveal that the residuals are normal and not autocorrelated; furthermore, the log-linear form of the model is well specified and there is a long-run relationship among variables.

6. Conclusions

This paper has investigated the long-run determinants of the demand for Italy's exports of tourism, using a Cointegrated Vector Autoregressive analysis, for the 1990-2007 period. The long-run price and income elasticities have the expected signs and are highly significant. Specifically, the relative price of tourism services is the main significant factor to push tourism exports with an elasticity of -2.14. The findings in relation to the other variables are very interesting: an increase of 1% in world industrial production leads to a rise in Italian tourism export revenues of about 1.85%. Oil price changes instead do not have a considerable impact of tourism revenues. In the short run, the reaction of tourism exports to income changes is limited, while the effects of competitiveness and oil price on exports is more immediate. Thereby, in the short period, Italian tourism exports are dominated by movements of competitiveness and oil price dynamics, while worldwide real income changes take longer to affect tourism export performances.

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ABSTRACT

This paper investigates the long-run determinants of the Italian exports in tourism services during the 1990-2007 period. The estimation is undertaken using a Cointegrated Vector Autoregressive analysis. The results suggest a significant and robust long-run cointegration relationship among demand for exports of tourism, price competitiveness and foreign income. In particular, real income and tourism price were found to have elastic long-term effects on real export revenues, while price of travel exhibits a more contained impact on export flows. The price for tourism services turns out to be the main driver of the Italian exports of tourism.

Keywords: CVAR Analysis, Long-run Price, Income Elasticities

JEL Classification: C22, F19, L83

RIASSUNTO

Elasticità rispetto al reddito e ai prezzi relativi delle esportazioni italiane di servizi turistici

Il presente lavoro analizza le determinanti di lungo periodo delle esportazioni italiane di servizi turistici dal 1990 al 2007. La stima è effettuata utilizzando un'analisi di cointegrazione vettoriale autoregressiva. I risultati suggeriscono un rapporto significativo e robusto di cointegrazione di lungo periodo tra la domanda di esportazioni del turismo, la competitività di prezzo e il reddito estero. In particolare, i risultati hanno evidenziato che variazioni nel reddito in termini reali e nella competitività di prezzo dei servizi turistici comportano variazioni significativamente elevate nel lungo periodo del valore delle esportazioni reali. Le variazioni dei prezzi dei trasporti hanno, invece, un impatto significativamente più debole sul valore delle esportazioni. La competitività di prezzo, quindi, si rivela essere il motore principale dei flussi di export di servizi turistici.

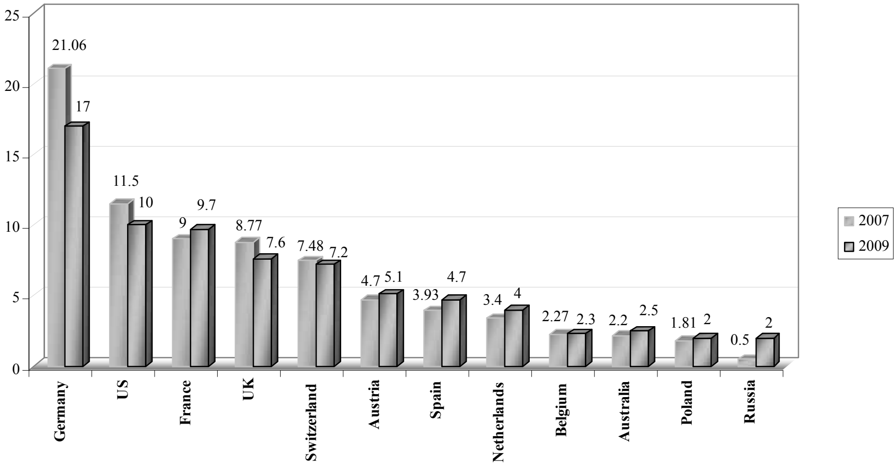
APPENDIX

TABLE 1 - *International Tourist Arrivals*

	International Arrivals (million)								Variations (%)							
	2002	2003	2004	2005	2006	2007	2008	2009	2002-01	2003-02	2004-03	2005-04	2006-05	2007-06	2008-07	2009-08
World	700	690	763	802	847	903	919	880	2.9	-1.4	10.6	5.4	5.6	6.6	1.8	-4.2
France	77	75	75.1	76	78.9	81.9	79.2	74.2	2.4	-2.6	0.1	1.2	4.2	3.8	-3.3	-6.3
Spain	52.3	51.8	53.6	55.6	58.2	59.2	57.2	52.2	4.5	-1	3.5	6	4.5	1.7	-3.4	-8.7
USA	43.6	41.2	46.1	49.4	51.0	56.0	57.9	54.9	-7.1	-5.5	11.9	7.2	3.8	9.8	3.4	-5.2
China	36.8	33	41.8	46.8	49.9	54.7	53.0	50.9	11	-10.3	26.7	12.1	6	9.6	-3.1	-4.0
Italy	39.8	39.6	37.1	36.5	41.1	43.7	42.7	43.2	0.6	-0.5	-6.3	-1.5	12.4	6.3	-2.3	1.2
UK	24.2	24.7	27.8	30	30.7	30.7	30.1	28.0	5.9	2.1	12.6	8	7.3	0.0	-2.0	-7.0
Mexico	19.7	18.7	20.6	21.9	21.4	21.4	22.6	21.5	-0.7	-5.1	10.2	6.3	-2.6	0.0	5.6	-4.9
Germany	18	18.4	20.1	21.5	23.5	24.4	24.9	24.2	0.6	2.2	9.2	6.8	9.6	3.8	2.0	-2.8
Austria	18.6	19.1	19.4	20	20.3	20.8	21.0	20.7	2.4	2.7	1.6	3	1.5	2.5	1.0	-1.4
Turkey	12.8	13.3	16.8	20.3	18.9	22.2	25.0	25.5	18.6	3.9	26.3	20.5	-6.7	17.5	12.6	2.0

Source: UNWTO (2008; 2010).

FIGURE 1 - *Share of Tourism Revenues in Italy. % Quota on Total, 2007 and 2009**



Note: From January to September 2009.

Source: Own elaborations on Italian Touring Club (2008) and Bank of Italy (2009) data.

TABLE 2 - *International Tourist Arrivals Data* Sources and Definitions

Series	Source and Construction
Italian Exports of tourism services	Data refer to 'travel credit', as the component of services in the current account of the Italian balance of payments. Data were supplied by the Italian Foreign Exchange Office and Bank of Italy. To control for seasonal changes data were seasonally adjusted.
World Industrial production index (2000=100)	Total industrial production data excluding construction at price 2000 (i.e. each month value has been divided by the arithmetic mean of the twelve months in year 2000 and afterwards multiplied by 100) have been taken from the OECD Main Economic Indicators. To control for seasonal changes data were seasonally adjusted.

Series	Source and Construction
Price of tourism (2000=100)	The price of tourism services was computed as follows: $p_i^{tour} = \left(\frac{CPI_i^{service}}{\sum_{j=1}^{N} CPI_j^{service} \cdot E_{i/j}} \right)$ Where the accommodation service CPI comprises hotels, boarding houses, motels, inns and establishments offering 'bed and breakfast', holiday villages and holiday prices. i ≠ j, j stands for the group of competitor countries (namely France, Spain, Greece, Croatia, Egypt and Turkey); E is the nominal effective exchange rate. CPI data have been collected from the Statistical Data Warehouse published by the European Central Bank and from Thomson Datastream. The exchange rate values were extracted from OECD Main Economic Indicators and Thomson Datastream.
Price of travel	The Europe Brent spot price taken from the Energy Information Administration (2008) was used for the cost of travel http://tonto.eia.doe.gov/dnav/pet/hist/rbrteM.htm

TABLE 3 - *Unit Root Tests (Augmented Dickey-Fuller and Phillips-Perron Statistics)*

	ADF		PP	
	Levels	First Differences	Levels	First Differences
lnx	-2.043	-4.316	-0.035	-15.514
lnw	-0.842	-4.043	-0.962	-9.169
lnp^{tour}	-1.649	-5.680	-1.538	-11.406
lnp^{trav}	-2.117	-4.652	-1.495	-10.858

Note: MacKinnon critical values (-3.49 at 1% level and -2.89 at 5% level).
Null hypothesis of unit root.

TABLE 4 - *Trace Test and Max Eigenvalue Test*

Sample 1990:01, 2007:10					
Eigenvalue	λ_{trace}	5% Crit. Value	Prob.**	Hypothesised Number of CE(s)	SBC
0.36	100.16	63.88	0.0000	None (r=0) *	247.9
0.17	47.75	42.91	0.0153	At most 1 ($r \leq 1$) *	255.3
0.11	25.22	25.87	0.0600	At most 2 ($r \leq 2$)	263.8
0.09	11.84	12.52	0.0647	At most 3 ($r \leq 3$)	274.8
Eigenvalue	$\lambda_{max\ eigenvalue}$	5% Crit. Value	Prob.**		
0.36	52.41	32.12	0.0001	H_0: r=0 H_1: r=1*	254.6
0.17	22.53	25.82	0.1288	H_0: r=1 H_1: r=2	260.5
0.11	13.39	19.38	0.2977	H_0: r=2 H_1: r=3	268.7
0.09	11.84	12.52	0.0647		

Note: * denotes rejection of the null hypothesis at 5% significance level.
** MacKinnon-Haug-Michelis (1999) p-values.

TABLE 5 - *LM Test Statistics for Residual Serial Correlation*

Sample: 1990:01, 2007:10 Null hypothesis: no serial correlation at lag order *h*		
Lags	LM-Stat.	Prob.
1	12.759	0.6903
2	16.732	0.4031
3	8.971	0.9146
4	9.699	0.8819
5	11.212	0.7962
6	14.175	0.5857
7	18.675	0.2859
8	16.029	0.4509
9	26.329	0.1896
10	13.311	0.6499
11	18.839	0.2771
12	21.266	0.1685
13	10.383	0.8459
14	9.748	0.8795

Note: Probs from chi-square with 16 df.

TABLE 6 - *Residual Normality Test*

Orthogonalisation: Cholesky (Lütkepohl)*

Component	Skewness	Chi-sq	df	Prob.
1	0.096	0.181	1	0.6702
2	-0.234	1.075	1	0.2998
3	-0.226	1.003	1	0.3164
4	0.056	0.062	1	0.8030
Joint		2.322	4	0.6767
Component	Kurtosis	Chi-sq	df	Prob.
1	3.360	0.702	1	0.4020
2	3.035	0.007	1	0.9350
3	3.063	0.022	1	0.8831
4	3.370	0.742	1	0.3890
Joint		1.473	4	0.6027
Component	Jarque-Bera	df	Prob.	
1	0.825	2	0.6232	
2	1.092	2	0.5776	
3	1.032	2	0.5012	
4	0.741	2	0.7321	
Joint	3.690	8	0.5452	

Note: *Null hypothesis: residuals are multivariate normal.

TABLE 7 - *Ramsey Reset Test*

F-statistic	1.529	Probability	0.218
Log likelihood ratio	1.579	Probability	0.209