The Nature of the Relationship Between International Tourism and International Trade: the Case of German Imports of Spanish Wine

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The second named author acknowledges financial support from a PIUNA Project at the University of Navarra, Pamplona, Spain

Contributed paper prepared for presentation at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August 12-18, 2006

Abstract

This paper deals with the relationship between international trade and tourism. We focus on the effect that German tourism to Spain has on German imports of Spanish wine. Due to the different properties of the series under analysis, which display different orders of integration, a long memory regression model is used, where tourism is supposed to be exogenous. The period covered is January 1998 to November 2004. The results show that tourism has an effect on wine imports that lasts between two and nine months, depending on the type of tourism series employed. Disaggregating the imports across the different types of wine it is observed that only for quality red wines from Navarra, Penedús and Valdepeñas, and to a certain extent for sparkling wine, tourism produces an effect on future import demand. From a policy-making perspective our results imply that the impact of tourism on the host economy is not only direct and short-term but also oblique and delayed, thus reinforcing the case for tourism as a means for economic development. [F14, C22, Q13, L83].

Keywords: international trade, tourism, long memory, Spanish wine.

1. Introduction

This paper aims at analyzing empirically whether tourism has an effect on future imports and, if yes, at determining the length of this effect. The temporal nature of the relationship between tourism and trade has not yet been econometrically quantified according to our knowledge. The paper deals with the case of German wine imports from Spain. We concentrate on wine due to several reasons. First, wine has become a truly globalized industry with about 40% of production (in value terms) being exported worldwide in 2001 (Anderson 2004). Second, in industrialized nations, wine is a commonly available commodity offered in a large variety mostly differentiated by production origin. Given that objective wine quality is hard to assess for non-expert consumers, the origin of a wine is often used as a short-cut quality indicator in cases where the country of origin is associated with a preferred holiday destination (Felzenstein et al. 2004). Last, wine imports have been shown to display the most significant connection with tourism activities among a range of investigated products in previous studies (Fischer 2004). Using Spain and Germany as the two countries of investigation seems interesting given that Spain is both a significant exporter of wine and an important tourist destination, while Germany is an important wine import market and a main tourism source country. From a policy perspective, the topic is important in at least two ways. First, industrial development officers and trade association officials may find it useful to better understand the dynamics and determinants of industrial export success. While in practice it may be difficult to actively influence tourism arrivals, the knowledge about confirmed tourism-trade interdependencies may enhance the ability to predict exports by taking into consideration tourism data. Second, tourism development agencies could demonstrate that the positive impacts of international travel on a national economy may be multiple and lasting. If tourists can be shown of not only generating income and jobs while they are in the country, but also of creating significant economic impulses, the attention given to tourism development may perhaps be raised.

In earlier studies, e.g., Easton (1998) analyzed whether Canadian total exports are complementary or substitutive to tourist arrivals, using pooled data regressions. The author finds "some evidence of substitution of Canadian exports for tourist excursions to Canada" (p. 542) by showing that when the relative price of exports goes up, the number of tourists visiting Canada increases. Kulendran and Wilson (2000) analyzed the direction of causality between different travel and (aggregate) trade categories for

Australia and its four main trading partners. Their results show that travel Granger causes international trade in some cases and vice versa in others. Shan and Wilson (2001) replicate this latter approach and also find two-way Granger causality using aggregate data for China. Aradhyula and Tronstad (2003) used a simultaneous bivariate qualitative choice model to show that cross-border business trips have a significant and positive effect on US agribusinesses' propensity to trade. Fischer (2004) explored the connection between aggregate imports and imports of individual products and bilateral tourist flows, using an error-correction model. His results show that trade-tourism elasticities are consistently higher for individual products.

2. The econometric model and the data

Most of the time series work examining the relationship between international trade and tourism is based on cointegration. However, that methodology imposes a priori the assumption that the individual series must share the same degree of integration, generally 1. In other words, the series must be individually I(1), and they will be cointegrated if there exists a linear combination of them that is I(0) stationary.[1]

In the context of the series analyzed in the present paper (which are aggregate wine imports and total tourism), we face however various problems. First, the two series do not posses the same order of integration. In fact, the wine imports data is I(0), while tourism is clearly nonstationary I(1) as it will be shown in section 3. Moreover, the latter series presents a clear seasonal pattern, while the former does not. We deal with the seasonal problem in tourism by using two approaches. First, we deseasonalize the series by using seasonal dummy variables. As a second approach, we take first seasonal

[1] We define an I(0) process as a covariance stationary process with a spectral density that is positive and finite at the zero frequency. An I(1) process is defined as a process that requires first differences to get I(0) stationarity.

differences (on the logged series), such that the series then represents monthly growth rates. Looking at the orders of integration of the two deseasonalized series, we still face the problem that both series are now I(1), while wine import is I(0), invalidating thus the analysis based on cointegration. In this paper we look at the relationship between the two variables (aggregate wine imports and tourism) by using fractional integration. We say that a time series $\{x_t\}$ is integrated of order d (denoted by I(d)) if:

(1) $$(1 - L)^d \, x_t \; = \; u_t, \qquad t \; = \; 1, 2, \ldots,$$

where u_t is I(0) and L is the lag operator ($Lx_t = x_{t-1}$). The literature has usually stressed the cases of d = 0 and 1. However, d can be any real number. If d > 0, x_t is said to be a long memory process, also called "strongly autocorrelated" because of the strong association between observations widely separated in time. The parameter d plays a crucial role in describing the persistence in the series: the higher the d, the higher the level of association between the observations.[2] We consider the following model,

(2) $$y_t \; = \; \beta' z_t \; + \; x_t, \qquad t \; = \; 1, 2, \ldots,$$

where y_t is a raw time series; β is a (kx1) vector of unknown parameters; z_t is a (kx1) vector of deterministic (or weakly exogenous) variables, and x_t is given by (1).

Robinson (1994) proposed a Lagrange Multiplier test of the null hypothesis:

(3) $$H_o : \; d \; = \; d_o,$$

in a model given by (1) and (2) for any real value d_o. Thus, if $d_o = 1$, we are testing for a unit root, though other fractional values of d are also testable. The functional form of the test statistic (denoted by $\hat{r}$) can be found in Robinson (1994) or in any of the numerous empirical application of the test. (See, e.g., Gil-Alana and Robinson, 1997).

[2] At the other end, if d < 0, x_t is said to be "anti-persistent", because the spectral density function is dominated by high frequency components. See Mandelbrot (1977).

Based on the null hypothesis (3), Robinson (1994) established that under very mild regularity conditions: $\hat{r} \rightarrow_d N(0,1)$ as $T \rightarrow \infty$.

The trade series (German imports of Spanish wine in euro) were obtained from two different Eurostat databases. First, aggregate imports were taken from "DS-016894 – EU trade since 1995 by HS2-HS4". The source of the disaggregated data is the "DS-016890 – EU trade since 1995 by CN8" database. The latter database contains about two dozens of different wine categories. From these the eight most important ones (referred to as products A to H in our analysis) were chosen. These together represent on average about 62% of total German wine imports from Spain over the period of investigation. Mainly due to data availability, the period has been selected reaching from 1998m1 to 2004m11. Except for the sparkling wine (A) and Sherry category (H), all products are quality wines produced in certain Spanish areas and sold with a controlled denomination of origin ("D.O.") label.

3. Results and discussion

Using the tests proposed by Dickey and Fuller (ADF, 1979), Phillips and Perron (PP, 1988) and Kwiatkowski, Phillips, Schmidt and Shin (KPSS, 1992) we observe that using no regressors, the tests cannot reject the hypothesis of a unit root for the aggregate wine imports (AWI) series (see table 1(i)). However, including an intercept and/or a linear trend, this hypothesis is rejected in all cases in favor of stationarity. Anyway, the use of these procedures for testing the order of integration of the series is too restrictive in the sense that they only consider integer values for d. Moreover, it is well known that the above methods have very low power if the alternatives are of a fractional form (Diebold and Rudebusch 1991; Hassler and Wolters 1994, etc.). Across table 1(ii) and

(iii) we display the results for the AWI series based on two approaches for estimating and testing the order of integration from a fractional point of view.

The results in table 1(ii) refers to the parametric approach of Robinson (1994) described in section 2, assuming that z_t in (2) is a deterministic component that might include a constant (i.e., $z_t = 1$) or a linear time trend (i.e., $z_t = (1, t)'$). In other words, we test the null hypothesis (3): $d = d_o$, for any real value d_o in the model given by:

$$y_t \;=\; \alpha \;+\; \beta t \;+\; x_t, \qquad (1 \;-\; L)^d\, x_t \;=\; u_t, \tag{4}$$

assuming that u_t is white noise and also autocorrelated. In the latter case, we use the Bloomfield (1973) exponential spectral model.[3] We display the 95% confidence intervals of the values of d_o where H_o (3) cannot be rejected for the three cases of no regressors, an intercept, and an intercept and a linear time trend. We also report in the table, (in parenthesis within the brackets), the value of d_o (d_o^*) which produces the lowest statistic in absolute value across d_o. That value should be an approximation to the maximum likelihood estimate. We observe that the intervals include the I(0) null in all cases, the values of d ranging from -0.37 (Bloomfield u_t with a linear time trend) and 0.39 (Bloomfield with no regressors). Moreover, the values of d producing the lowest statistics are in all cases negative, implying thus anti-persistent behavior.

As an alternative approach to estimate d, we also use a semiparametric method proposed by Robinson (1995). It is a local "Whittle estimate" ($\hat{d}$) in the frequency domain, based on a band of frequencies that degenerates to zero. Robinson (1995) proved that: $\sqrt{m}\,(\hat{d} - d_o) \to_d N(0, 1/4)\;\; as\; T \to \infty,$ where m is a bandwidth number and d_o is the true value of d. Table 1(iii) displays the estimates of d across m. We also include in the figure the 95%-confidence interval of the I(0) case. It is observed that all values of d are within the I(0) interval, which is consistent with the results based on the parametric approach.

(Insert tables 1 - 3 about here)

As for the tourism series, similarly to the previous case, nonstationarity was found in both deseasonalized series, using seasonal dummies (table 2) or monthly growth rates (table 3). The results are very similar in both series: using classic methods (tables 2(i) and 3(i)) evidence of a unit root is found in all cases when using the test statistic with most realistic assumptions. Using the fractional framework, ((ii) and (iii)) the unit root is almost never rejected though fractional orders of integration, with values below 1 are also plausible in most of the cases. To conclude, we can summarize the results presented so far by saying that the aggregate wine imports seem to be I(0), while tourism, once the seasonal component has been removed, is nonstationary I(1).

Next we examine the relationship between the two variables using a long memory regression model. Denoting deseasonalized tourism as DT_t, we employ through the model given by (1) and (2), testing H_o (3) for given values d_o = -2, -1.99, …, 0, …, 1.99, 2, assuming that u_t is white noise and Bloomfield (with p = 1).[4] However, in order to examine the dynamic structure of the two series, we use as a regressor lagged values of the tourism series.[5] In other words, we test the null model,

$$(5) \qquad AWI_t = \alpha + \beta DT_{t-k} + x_t, \qquad (1 - L)^{d_o} x_t = u_t,$$

[3] This is a non-parametric approach of modeling the I(0) disturbances that produces autocorrelations decaying exponentially as in the AR(MA) case.

[4] p refers to the number of parameters required to describe the short-run dynamics. Other values of p were also employed and the results were very similar to those reported in the paper with p = 1.

[5] We conducted tests for exogeneity of tourism in the wine imports equation. To establish evidence for non-causality, an unrestricted VAR was used. Weak exogeneity appeared to be satisfied in the dynamic equation because when entering the current value of DT in the equation it proved to be insignificantly different from zero. This finding supports the view that DT is weakly exogenous for the model.

with k in (5) equal to 1, 2, …, and 12. First, we employ the deseasonalized tourism series based on the seasonal dummies. Table 4a reports the results for white noise u_t, while table 4b refers to the Bloomfield model. In both cases, we report, for each k, the estimates for the coefficients (and their t-ratios), the value of d_o producing the lowest statistic, its confidence interval (at the 95% level) and the value of the test statistic.

(Insert tables 4 - 6 about here)

Starting with the case of white noise u_t, we see that β appears significant for k = 1, 2, 3 and 4, implying that tourism has an effect on wine imports that lasts at least the following four months. We see that the interval of non-rejection values is wide in all cases, ranging from -0.41 (k = 8) to 0.05 (k = 6). The case of d = 0 is included in all intervals but lowest statistics are obtained for negative d. Note that the estimates of α and β are based on the value of d producing the lowest statistic, which seems to be appropriate from a statistical viewpoint. Imposing a weak dependence structure (table 4b) the intervals are now wider, the values of d with the lowest statistics being still negative, and the slope coefficient is now significant for the first seven periods, implying a longer dynamic effect of tourism than in the previous case. Table 5 is similar to table 4 above but using the monthly growth rates as the deseasonalized series. If u_t is white noise, only the first two lags appear statistically significant, however, using the model of Bloomfield (1973), the significant coefficients reach the lag 9.

We can therefore conclude this section by saying that there is some kind of dynamic behavior in the effect that German tourism has on German imports of Spanish wines. This significant effect lasts less than a year though varies substantially depending on the model considered and the type of series used for measuring tourism.

Finally we examine separately the different wine types. We consider the same model as in (5), using specific types of wine rather than the aggregate flow. In table 6 we use the DT_t series, for the two cases of white noise and Bloomfield disturbances. We observe that the results are similar in both cases, implying that the short-run dependence is not important when describing the behavior of these two series. In general, we observe that only for two wine types (reds from Navarra and those from Valdepeñas) most of the coefficients are significant across the whole period. For sparkling wine and reds from Penedús, the significant coefficients start five periods after, and the effect lasts three periods for the former and 8 months for the latter wine type.

4. Conclusions

The obtained results are summarized in table 7. The first row gives the total effect as the sum of the monthly effects in euro per one percent increase of tourists.[6] On average, total monthly wine imports of Spanish wine into Germany have increased by about EUR 2 per every increase of roughly 5,000 tourists per month over the analyzed period. For individual wine types, the impact has been mixed. While for sparkling wine the positive effect (about EUR 1.8) is lower than for the overall wine category, three wine types, all quality reds (from Navarra, Penedús and Valdepeñas), have experienced import-promoting effects of about EUR 12-14. Taken together, these three wine types accounted for about 7% of total wine import value during the analyzed period.

(Insert table 7 about here)

We find that the connection between tourism and trade seems only to hold for red wines and sparkling wine but not for white wine. Moreover, there seems to be a possible

[6] The numbers are the simple mean from the estimates given in tables 4 and 6. The interpretation of the estimates for the growth rates is not directly comparable to the ones obtained from the deseasonalized travelers series, therefore they have not been included in the summary calculation of table 7.

connection between wine quality (as expressed by price) and the magnitude and length of the tourism effect. Table 7 lists unit values (import value/import quantity) as a proxy for import prices of the analyzed wine types. The two most-expensive red wine types (Penedús and Valdepeñas) also display the strongest import-promoting effects. However, quality reds from Rioja seem to be an exception. Although the average import unit value at EUR 2.3 per liter is higher than the one for quality reds from Navarra (EUR 1.6), no significant relationship with the tourism series has been found. A possible explanation for this exception may be the fact that Rioja reds (accounting for on average 19% of imports during the period of investigation) comprise both some of the best, most expensive and internationally-appreciated Spanish quality wines and lots of lowly-priced bulk wine, mainly produced in the 'Baja' region (Albisu 2004). Given their long tradition, Rioja wines may thus be internationally received as the 'typical' Spanish wine, similar to Bordeaux in France or Chianti reds in Italy. Hence, Rioja wine exports may reflect both demand by quality-oriented international wine collectors and price-conscious mass retailers, both types of demand probably being little affected by international tourism flows. The average lengths of the import-promoting effects is about 5.5 months for total wine imports, three months for sparkling wine and 9-10 months for the just mentioned quality reds. This result clearly shows that, at least in the analyzed case, tourism has a positive impact on the travel destination economy which lasts for many months after the tourists have already left the country. Policy makers and industry as well as tourism development officials are therefore well-advised to consider these interactions in their planning and budget allocation decisions.

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Table 1. Statistics for the Aggregate Wine Imports Series

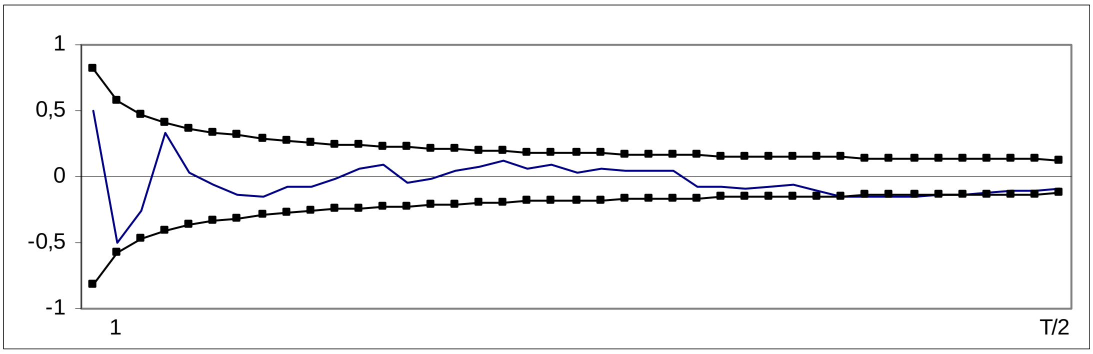
1(i) Unit Root Tests

	No Regressors	With an Intercept	With a Linear Trend
ADF	-0.39 (-1.94)	-4.59 (-2.90)	-4.56 (-3.47)
PP	-1.42 (-1.94)	-10.0 (-2.90)	-9.99 (-3.47)
KPSS	---	0.076 (0.46)	0.075 (0.14)

1(ii) 95% Confidence Intervals of the Non-Rejection Values of d

	No Regressors	With an Intercept	With a Linear Trend
White noise	[-0.15 (-0.11) 0.06]	[-0.26 (-0.14) 0.02]	[-0.34 (-0.21) 0.02]
Bloomfield (p = 1)	[-0.16 (-0.09) 0.32]	[-0.33 (-0.08) 0.31]	[-0.35 (-0.26) 0.28]
Bloomfield (p = 2)	[-0.17 (-0.13) 0.39]	[-0.37 (-0.18) 0.36]	[-0.37 (-0.19) 0.34]

1(iii) Estimates of d Based on the Gaussian Semiparametric Estimate



Notes: 1(i): In parenthesis the critical values at the 5% level. 1(ii): The values in parenthesis within the brackets refer to the value of d producing the lowest statistic. 1(iii): The horizontal axis refers to the bandwidth parameter number, while the vertical one corresponds to the estimated values of d. The dotted line refers to the 95% confidence interval for the I(0) hypothesis.

Table 2. Statistics for the Deseasonalized Travelers (DT) Series, Using Seasonal Dummies

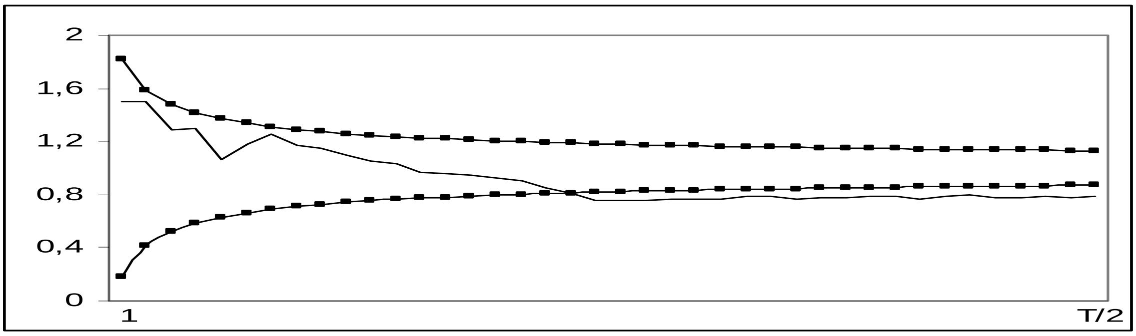
2(i) Unit Root Tests

	No Regressors	With an Intercept	With a Linear Trend
ADF	-2.13 (-1.94)	-2.19 (-2.90)	-2.38 (-3.47)
PP	-2.68 (-1.94)	-2.65 (-2.90)	-2.59 (-3.47)
KPSS	---	0.98 (0.46)	0.44 (0.146)

2(ii) Confidence Intervals of the Non-Rejection Values of d

	No Regressors	With an Intercept	With a Linear Trend
White noise	[0.62 (0.75) 0.95]	[0.62 (0.73) 0.89]	[0.65 (0.74) 0.89]
Bloomfield (p = 1)	[0.40 (0.59) 0.91]	[0.45 (0.76) 1.02]	[0.61 (0.80) 1.03]
Bloomfield (p = 2)	[0.30 (0.61) 1.14]	[0.32 (0.98) 1.31]	[0.58 (0.99) 1.39]

2(iii) Estimates of d Based on the Gaussian Semiparametric Estimate



Notes: 2(i): In parenthesis the critical values at the 5% level. 2(ii): The values in parenthesis within the brackets refer to the value of d producing the lowest statistic. 2(iii): The horizontal axis refers to the bandwidth parameter number, while the vertical one corresponds to the estimated values of d. The dotted line refers to the 95% confidence interval for the I(0) hypothesis.

Table 3. Statistics for the Monthly Growth Rate of Travelers Series

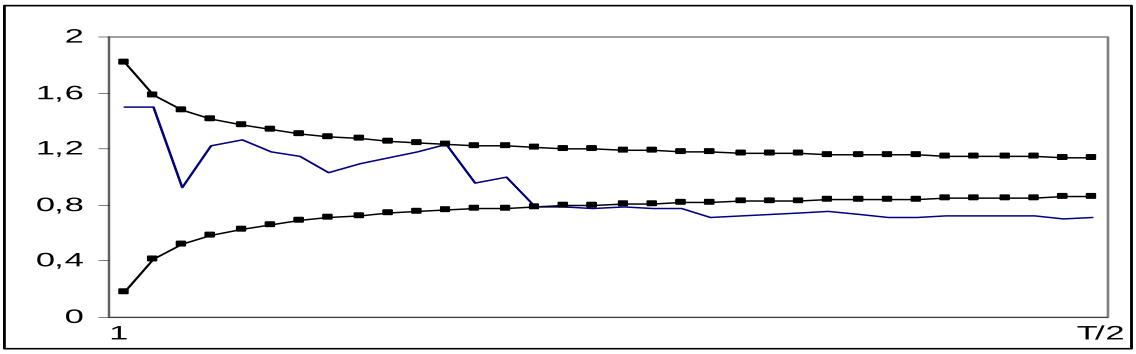
3(i) Unit Root Tests

	No Regressors	With an Intercept	With a Linear Trend
ADF	-2.50 (-1.94)	-2.43 (-2.90)	-1.64 (-3.47)
PP	-3.02 (-1.94)	-2.91 (-2.90)	-2.44 (-3.47)
KPSS	---	0.99 (0.46)	0.23 (0.146)

3(ii) 95% Confidence Intervals of the Non-Rejection Values of d

	No Regressors	With an Intercept	With a Linear Trend
White noise	[0.62 (0.73) 0.90]	[0.56 (0.79) 1.11]	[0.51 (0.77) 1.19
Bloomfield (p = 1)	[0.56 (0.66) 0.80]	[0.57 (0.83) 1.11]	[0.52 (1.06) 1.39]
Bloomfield (p = 2)	[0.60 (0.69) 0.82]	[0.66 (0.87) 1.10]	[0.63 (1.07) 1.41]

3(iii) Estimates of d Based on the Gaussian Semiparametric Estimate



Notes: 3(i): In parenthesis the critical values at the 5% level. 3(ii): The values in parenthesis within the brackets refer to the value of d producing the lowest statistic. 3(iii): The horizontal axis refers to the bandwidth parameter number, while the vertical one corresponds to the estimated values of d. The dotted line refers to the 95% confidence interval for the I(0) hypothesis.

Table 4. Estimates of Parameters in AWI_t and $TRAV_{t-k}$ Relationship, Using The Deseasonalized Travelers Series: $AWI_t = \alpha + \beta DT_{t-k} + x_t; \quad (1-L)^d x_t = u_t$

4a) With White Noise Disturbances (in Parenthesis t-Ratios)

k	Alpha	Beta	d-95% Confidence Interval	d	Stat.
1	16.738 (1152.21)	**0.507 (2.951)**	[-0.37 0.01]	-0.22	-0.0245
2	16.751 (1126.75)	**0.467 (2.713)**	[-0.39 0.03]	-0.22	0.0445
3	16.751 (1056.77)	**0.358 (1.996)**	[-0.39 0.04]	-0.21	-0.0445
4	16.733 (1003.17)	**0.352 (1.911)**	[-0.37 0.04]	-0.20	0.0505
5	16.736 (992.33)	0.293 (1.592)	[-0.39 0.04]	-0.20	-0.035
6	16.755 (971.13)	0.268 (1.440)	[-0.36 0.05]	-0.20	0.0255
7	16.761 (910.11)	0.217 (1.147)	[-0.36 0.04]	-0.19	0.0053
8	16.770 (1190.02)	0.059 (0.345)	[-0.41 0.04]	-0.25	-0.0157
9	16.781 (1178.78)	-0.112 (-0.035)	[-0.38 -0.03]	-0.24	-0.0065
10	16.779 (1198.88)	-0.070 (-0.445)	[-0.40 -0.03]	-0.23	-0.0367
11	16.784 (1137.70)	-0.159 (-0.963)	[-0.39 0.02]	-0.24	0.0243
12	16.773 (1153.71)	-0.128 (-0.798)	[-0.41 0.01]	-0.22	0.0451

4b) With Bloomfield (p = 1) Disturbances (in Parenthesis, t-Ratios)

k	Alpha	Beta	d-95% Confidence Interval	d	Stat
1	16.734 (2645.81)	**0.486 (4.363)**	[-0.62 0.03]	-0.37	0.0065
2	16.713 (3555.17)	**0.433 (4.650)**	[-0.75 0.02]	-0.46	-0.0004
3	16.712 (3837.67)	**0.396 (4.445)**	[-0.77 0.02]	-0.44	0.0566
4	16.752 (3640.92)	**0.368 (4.016)**	[-0.85 0.01]	-0.43	-0.0987
5	16.754 (4838.55)	**0.302 (3.911)**	[-0.95 0.05]	-0.41	-0.0425
6	16.753 (4411.51)	**0.260 (3.219)**	[-0.97 0.05]	-0.49	0.0044
7	16.754 (2930.76)	**0.219 (2.136)**	[-0.94 0.05]	-0.49	0.0140
8	16.766 (2381.66)	0.053 (0.444)	[-0.75 0.08]	-0.47	-0.0447
9	16.787 (2519.90)	-0.105 (-1.111)	[-0.70 0.05]	-0.45	-0.0154
10	16.781 (2565.64)	-0.109 (-0.947)	[-0.75 0.04]	-0.45	-0.0156
11	16.790 (3225.34)	-0.198 (-1.150)	[-0.81 0.10]	-0.49	-0.0655
12	16.777 (3561.03)	-0.113 (-1.345)	[-0.82 0.11]	-0.44	-0.0165

Note: In bold, significant values at the 5% significance level.

Table 5. Estimates of Parameters in AWI_t and $TRAV_{t-k}$ Relationship Using Monthly Growth Rates: $AWI_t = \alpha + \beta DT_{t-k} + x_t; \quad (1-L)^d x_t = u_t$

5a) With White Noise Disturbances (in Parenthesis, t-Ratios)

k	Alpha	Beta	d-95% Confidence Interval	d	Stat
1	16.771 (1227.33)	**0.234 (2.031)**	[-0.45 0.04]	-0.25	-0.0242
2	16.769 (1150.38)	**0.223 (1.838)**	[-0.44 0.09]	-0.25	-0.0354
3	16.761 (1058.18)	0.045 (0.342)	[-0.43 0.12]	-0.22	0.0254
4	16.764 (939.35)	0.135 (1.382)	[-0.41 0.14]	-0.17	-0.0235
5	16.765 (959.99)	0.131 (1.081)	[-0.44 0.13]	-0.19	-0.0235
6	16.766 (967.77)	0.070 (0.577)	[-0.43 0.12]	-0.20	-0.0153
7	16.769 (957.17)	0.067 (0.617)	[-0.42 0.11]	-0.19	0.0611
8	16.766 (904.16)	0.059 (0.863)	[-0.42 0.15]	-0.19	0.0783
9	16.769 (881.81)	0.035 (0.256)	[-0.44 0.18]	-0.19	0.0145
10	16.763 (940.87)	0.013 (0.045)	[-0.44 0.15]	-0.21	0.0246
11	16.763 (928.85)	-0.051 (-0.467)	[-0.45 0.11]	-0.22	-0.0265
12	16.763 (878.28)	-0.043 (-0.376)	[-0.44 0.15]	-0.21	0.0556

5b) With Bloomfield (p = 1) Disturbances (in Parenthesis, t-Ratios)

k	Alpha	Beta	d-95% Confidence Interval	d	Stat
1	16.777 (6113.28)	**0.212 (6.134)**	[-1.33 0.17]	-0.53	0.0129
2	16.780 (8934.05)	**0.255 (11.041)**	[-1.31 0.28]	-0.55	-0.0545
3	16.766 (8500.14)	**0.055 (2.400)**	[-1.46 0.22]	-0.53	-0.0365
4	16.773 (10816.4)	**0.106 (6.152)**	[-1.47 0.15]	-0.58	-0.0654
5	16.773 (11433.3)	**0.077 (4.688)**	[-1.66 0.17]	-0.56	0.0655
6	16.772 (11261.3)	**0.073 (4.344)**	[-1.62 0.21]	-0.67	-0.0276
7	16.770 (9670.66)	**0.057 (3.151)**	[-1.62 0.21]	-0.66	0.0065
8	16.773 (10341.6)	**0.087 (5.137)**	[-1.55 0.24]	-0.66	0.0067
9	16.771 (14991.8)	**0.090 (8.744)**	[-1.64 0.23]	-0.71	-0.0869
10	16.773 (10229.8)	0.021 (1.911)	[-1.63 0.24]	-0.69	-0.0317
11	16.771 (12723.2)	-0.021 (-1.156)	[-1.71 0.19]	-0.67	0.0055
12	16.765 (12960.2)	0.005 (1.056)	[-1.72 0.15]	-0.63	0.0156

Note: In bold, significant values at the 5% significance level.

Table 6. Slope Coefficients in the Regression Using the DT (Dummy Variables) Series

6a) With White Noise u_t

k	A	B	C	D	E	F	G	H
1	0.275	-1.682	-1.264	**1.497**	0.001	-0.327	**1.432**	-0.354
2	0.307	-0.821	-0.835	**1.458**	0.204	0.100	**1.174**	-0.736
3	0.287	-0.403	-0.311	**1.229**	0.529	-0.404	**1.279**	-1.049
4	0.519	-0.887	-1.048	**1.073**	0.651	-1.050	**0.861**	-1.520
5	**0.608**	-0.022	0.024	**1.000**	**1.226**	-0.548	**1.567**	-1.101
6	**0.612**	0.087	-0.694	**1.101**	**1.614**	-0.900	**1.227**	-1.120
7	**0.617**	1.234	-1.059	**1.248**	**1.521**	-0.829	**1.532**	-1.445
8	0.279	-0.673	-0.525	**0.895**	**1.249**	-0.560	**1.332**	-0.900
9	0.019	-1.980	-0.897	0.612	**1.447**	-1.074	**1.100**	-0.864
10	0.098	-1.560	-0.336	**0.799**	**1.483**	-1.335	**1.008**	-0.875
11	-0.045	0.293	-1.177	**1.257**	**2.177**	-1.198	**1.256**	-0.399
12	0.149	0.890	-0.782	0.482	**2.287**	-1.206	**1.437**	-0.273

6b) With Bloomfield (p = 1) u_t

k	A	B	C	D	E	F	G	H
1	0.274	-1.697	-1.112	**1.674**	-0.291	-0.033	**1.226**	-0.135
2	0.304	-1.583	-0.379	**1.552**	0.018	0.867	0.894	-0.701
3	0.308	-1.574	1.111	**1.429**	0.387	-0.008	**1.250**	-1.015
4	0.518	-1.470	-1.221	**1.361**	0.368	-1.074	0.602	-1.522
5	**0.604**	-1.225	**1.953**	**1.028**	**1.157**	0.344	**1.534**	-1.062
6	**0.612**	-1.188	-0.403	**1.144**	**1.605**	-0.739	**1.119**	-1.103
7	**0.615**	-1.073	-1.212	**1.310**	**1.537**	-0.480	**1.539**	-1.474
8	0.279	-1.326	0.284	**0.924**	**1.455**	0.622	**1.265**	-0.905
9	0.039	-1.398	-0.876	0.544	**1.873**	-0.547	**1.034**	-0.869
10	0.121	-1.194	0.690	**0.805**	**2.012**	1.206	**0.947**	-0.885
11	-0.011	-0.803	-1.485	**1.263**	**2.309**	-1.547	**1.275**	-0.404
12	0.196	-0.622	-0.698	0.468	**2.353**	-1.437	**1.464**	-0.310

Note: A: Sparkling wine; B: White from Penedes; C: White from Rioja; D: Reds from Navarra; E: Reds from Penedús: F: Reds from Rioja; G: Reds from Valdepeñas; H: Sherry. In bold, significant coefficients at the 5% significance level.

Table 7. Summary Results from Estimated Regressions: Relationship Between German Tourists to Spain and German Imports of Spanish Wine

	Wine type				
	Aggregate (total) (AWI)	Sparkling (A)	Quality red from Navarra (D)	Quality red from Penedús (E)	Quality red from Valdepeñas (G)
Average sum of effects (euro per one percent increase of tourists)	2.07	1.83	12.02	13.65	13.93
Average lengths of effect (months)	5.5	3	10	8	11
Import unit value (euro per liter), 2003	1.34	2.72	1.64	3.11	2.70
Average share in AWI value (%), Jan. 1997 to Nov. 1994	100	38.8	2.6	1.2	2.9

Note: Unit values are calculated from Eurostat data. The 2003 import unit values for the other analyzed products are: white wine from Penedús (B): 2.78 euro per liter; white wine from Rioja (C): 1.89; red wine from Rioja (F): 2.31; Sherry (H): 2.32.