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Price adjustment in world wine markets: A cointegration analysis

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Abstract

World wine trade has undergone an exponential dynamic in recent years because of the fall in domestic demand of the main traditional producing countries. This study aims to measure the degree of price integration in the international wine market, within a framework where review and re-adaptation of strategies and behaviors is continuous in a scenario of increasing globalization. Prices from the principal Old World exporting countries have been taken into account, and those from New World exporters. The methodology adopted is based on estimating the Error Correction Vectors, linear and with thresholds. Results obtained show that export prices of Old World countries in the EU are homogenous and seek equilibrium within the same cointegration space; and, on the other hand, that New World exporters do not share a common behavior in their exporting dynamics. France appears as the “leader” of Old World countries, although its leadership and trend is not followed or shared by the New World exporters. However, Italy and particularly Spain are the ones cointegrated, linearly and non-linearly, with markets from New World countries, USA and Argentina. Therefore, France is reference within the EU, while New World exporters countries take Italy and Spain as reference competitors.

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Keywords: Cointegration; Export prices; Wine

1. Introduction

During the past two decades, the global tendency of the wine industry has experienced fundamental changes (Cassi et al., 2009). The so-called New World (NW) countries: USA, Chile, Australia, Argentina and South Africa, have now joined the stable productive and commercial pattern of wine production concentrated in a selected number of European countries called Old World (OW), namely France, Italy and Spain, which used to dominate the international market. In recent years the NW countries have positioned themselves in the international world market designing lowering price strategies to compete with the traditional European producer countries (Anderson, 2004). OW countries have a developed, strongly regulated industry, with traditional practices and high amortization. NW countries are young producers in general and have experienced great growth in recent decades without much

concern for controlled designations of origin but with a strong drive to incorporate new technology (Moreira et al., 2011; Villanueva, 2011).

Therefore, a continuous process of the restructuring of actors in the global market has taken place, making the rhythm of their trend and of their strategies change constantly (Calderón and Blanco, 2005). In this context, numerous studies are focused on analyzing the new dynamics of the international market: Campbell (2000), Anderson (2001), Green and Pierbattisti (2002), Anderson, Norman and Wittwer (2003), Pesenti (2011), Villanueva (2011), Bentzen and Smith (2002) and Triguero (2002). However, one aspect of special interest is the study of the spatial relation of prices based on market integration, as its analysis helps explain the global operation of the markets (Sanjuan and Gil, 1997). Market integration refers to the price behavior of one product in different locations. Integrated markets are those where price variations in one market are related to price variations in another market. That is, markets in which prices move in a synchronized rather than independent way (Monke and Petzel, 1984). The Engle–Granger Cointegration Theory (Engle and Granger, 1987) is

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Table 1
Descriptive statistics and stationarity contrasts.

<i>p</i>	<i>N</i>	Min.	Max.	Mean	Tip. Dev.	ADF ^(a) p-Value in levels	ADF p-Value in first differences	Ng-Perron ^(b) p-Value in levels	Ng-Perron p-Value in first differences
France	98	3.98	27.00	12.01	6.90	0.3978	0.0001	−337.653	−571.460
Italy	98	2.05	12.17	5.89	3.54	0.3471	0.0000	−391.451	−470.252
Spain	98	0.22	7.73	2.78	1.86	0.1752	0.0000	−409.549	−665.434
Argentina	93	1.08	3.13	1.89	0.58	0.6481	0.0001	−266.189	−372.360
Australia	98	2.04	3.76	2.78	0.35	0.1064	0.0000	−900.239	559.428
Chile	98	1.22	2.09	1.56	0.19	0.2445	0.0001	−646.254	−127.610
South Africa	97	0.36	2.57	1.84	0.30	0.0000	0.0000	−426.334	−0.14348
USA	98	1.63	4.46	2.50	0.65	0.5618	0.0001	−122.126	−546.431

^(a)*p*-Value ≤ 0.5 rejects *H*₀ of non-stationarity.

^(b)Contrasts on the MZa test. Asymptotic critical values (5% of significance is − 8.10)

an econometric technique which allows for viewing market spatial integration as a long-term balanced relationship with price adjustment taking place in the short term; integration is confirmed if prices are cointegrated. (Sanjuan and Gil, 1997).

This study aims to analyze the integration level of the international wine market specifically: 1) within the OW, 2) within the NW and 3) between OW–NW. To that end we will use the relationships between export prices as an indicator of the level of connection between both markets (Hernández et al., 2002).

2. Materials and methods

2.1. Sample and variables

The database used is composed of wine exports price series. The series has a monthly time step and the time period runs from January 2005 to February 2013. Prices are in €/l in constant units¹ and have been obtained as the ratio between export values and export volumes. Data comes from Trade Map (<http://www.trademap.org/>). The product studied is *Wine of fresh grape, including fortified wines; grape must, except for the 2009 consignments* (code 2204 of the European Commission product classification system²). The wine classified in this consignment is exclusively the final product of the alcoholic fermentation of the must and the product resulting from fresh grape trading.³

The countries included in the database are the main exporting countries according to the OEMV (Observatorio español del mercado del vino) (2012): France, Italy, Spain, Australia, Chile, USA, Argentina and South Africa. The fact that not all wine selling countries are included does not imply significance problems in the results. According to the formula

¹The set of exports deflated with the World Bank index. <http://datos.bancomundial.org/>.

²<http://exporthelp.europa.eu/thdapp/nomenclature/NomenclatureServlet?action=nomen§ion=stat&taticCode=2204000000&prodLine=80&limitLevel=8&simDate=20100101&languageId=es>

³http://www.armonizado.com/imprimir_notasexplicativas.php?pagina=2204

for finite samples, $\left[n = \frac{Z^2 * p * (1-p) * N}{N * e^2 + Z^2 * p * (1-p)} \right]$, the sample error (*e*) of not considering all selling countries is virtually null for a 0.05 *p*-Value. Thus, for the export value variable the error represents 0.3%⁴ and for the export volume variable the error represents 0.4%.⁵ Furthermore, the sample covers eight complete years (January 2005–February 2013). This number is sufficient to apply the cointegration technique given that following Pulido and López (1999), time series covering information for 6 to 10 complete years are suitable for presenting monthly data.

The descriptive statistics of the variables that are included (Table 1) show a range of variation in the results. In the first place, prices from the three European countries are conditioned in their high spectrum by the prices of French champagne, Italian frizzante and Spanish cavas. In the second place, because New World countries have had to compete at low prices against the European producing countries in order to penetrate the markets where the European traditionally had a dominion position.

2.2. Method

In order to carry out the study we used the linear and threshold cointegration technique, as in studies by Baldi et al. (2010, 2013) for the global wine industry represented by France, USA, Chile, China and Argentina; Mencet et al. (2006) for wine exports from France, Greece and Turkey; Pinilla and Ayuda (2002) for Spanish wine exports; and Orçun and Temiz (2011) for the Turkish wine industry. The reason we used this technique is that following Barret (2001), Fackler and Goodwin (2001), Meyer and von Cramon-Taubadel (2004),

⁴In $\left[n = \frac{Z^2 * p * (1-p) * N}{N * e^2 + Z^2 * p * (1-p)} \right]$: *n* = 20,167.1 million € (export values of the 8 countries in the sample in 2012), *N* = 25,282.6 million € (world exports), *p* = 0.5, *e* = estimation error and *Z* = 1.96, (normal value at the 95% confidence level). OeMv data.

⁵In $\left[n = \frac{Z^2 * p * (1-p) * N}{N * e^2 + Z^2 * p * (1-p)} \right]$: *n* = 8232.2 million litres (export volumes of the 8 countries in the sample in 2012), *N* = 9391.7 million litres (world exports), *p* = 0.5, *e* = estimation error and *Z* = 1.96, (normal value at the 95% confidence level) OeMv data.

Table 2
VEC Results (Spain–Italy–France).

	D(LES)	D(LFR)	D(LIT)
λ	-0.309514*** (8.81e-05)	0.007238 (0.8694)	0.059932 (0.2369)
D(LES(-1))	-0.330316*** (0.0022)	-0.170810*** (0.0063)	-0.193236*** (0.0070)
D(LES(-2))	0.107957 (0.2947)	-0.063567 (0.2902)	-0.078292 (0.2561)
D(LIT(-1))	-1.081.924*** (0.0047)	-0.021361 (0.9220)	-0.138811 (0.5792)
D(LIT(-2))	-0.402938 (0.2465)	-0.253374 (0.2119)	-0.320917 (0.1683)
D(LFR(-1))	1.761.330*** (0.0001)	0.004283 (0.9865)	0.153096 (0.5985)
D(LFR(-2))	0.559155 (0.1770)	0.256024 (0.2883)	0.313240 (0.2574)
C	1.41133*** (0.0001)	-0.0322978 (0.8743)	-0.272266 (0.2465)
R^2	0.380357	0.108905	0.124854
Sum sq. resids	9.963278	3.389715	4.456385
Durbin–Watson	2.080929	2.028627	1.974000
Cointegration equation: $\beta(1)*LES(-1)+\beta(2)*LFR(-1)+\beta(3)*LIT(-1)+\beta(4)$			
Estimated cointegration equation: $2.27*LES(-1)+8.53*LFR(-1)-7.93*LIT(-1)-9.17$			

Contrast of exclusion	p-Value	Coefficient
$\beta(1)$	0.000044	-2.27
$\beta(2)$	0.000293	8.53
$\beta(3)$	0.000194	-7.93
Weak exogeneity		
	p-Value	Coefficient
$\lambda(1,1)$	0.000162	-0.309514
$\lambda(2, 1)$	0.875993	0.007238
$\lambda(3, 1)$	0.243085	0.059932

In parenthesis p-value of t-statistics of coefficient estimates.
*** Denotes significance at the 1-percent level.

(a) ES: Spain, FR: France, IT: Italy.

Serra et al. (2006), Ihle et al. (2009), Stephens et al. (2010), Orçun and Temiz (2011) and Espostia and Listortib (2013) regard it suitable for the study of agricultural markets integration. Furthermore, Gujarati (1995) points out that one of the main advantages of the cointegration technique is that it does not require distinguishing between endogenous and exogenous variables as each variable is affected by the others and affects the other variables capturing the feedback, impact and adjustment of some markets over others. The traditional econometric techniques of multiple equation models do not allow this, nor do the classic and modern time series techniques; the former because they do not allow for all the variables in a model to be a function of the others and the latter because they only study the behavior of a variable on the basis of itself.

The concept of integration allows clarifying the type of spatial relationship across markets: two markets will have a high degree of spatial integration if price variations in one of them are transferred to the other, or they can be segmented if they there is no connection of any kind between their prices (Goodwin and Schroeder, 1991). Moreover, in the former case,

if the transfer of price variation from one market to another is immediate in time, we have linear cointegration. If movement towards balance happens only when price variations exceed a given threshold, cointegration will be non-linear.

The model which gives shape to cointegration is the so-called Vector Error Correction Model (VECM), which can be functionally summarized as follows:

$$\Delta P_t = f(P_{t-1}, \Delta P_{t-k}, \varepsilon_t) \tag{1}$$

That is, price variation (ΔP_t) in a market composed of a set of countries for a specific product and at a given moment is a function of the prices available in that market (P_{t-1}) and the variation experienced by those prices (ΔP_{t-k}). Random shock is represented by (ε_t).

Here we will study two markets: 1. Old World, which includes Spain, France and Italy and 2. New World, which includes the USA, Australia, Chile, South Africa and Argentina. Thus, the object pursued through the use of cointegration and its VEC models is to study the transfer of price adjustments in the short term to reach balance in the long term and

Table 3
Selection of optimal delay and Johansen test and Hansen and Seo test, crossed pairs.

	France	Italy	Spain
USA	AIC(2)= -5.355816	AIC(2)= -5.020061	AIC(2)= -4.120703
	BIC(1)= -5.126179	BIC(1)= -4.777246	BIC(2)= -3.850140
	HQC(2)= -5.24586	HQC(2)= -4.910774	HQC(2)= -4.011416
	DH(1)=2.10861e-048	DH(1)=2.02009e-072	DH(2)=1.82403e-009
	DH(2)=5.49129e-050	DH(2)=9.76041e-071	
	LC-P(1)=0.43	LC-P(1)=0.4290	LC-P(2)=0.1296
	LC-P(2)=0.3049	LC-P(2)=0.3870	TC-P(2)=0***
	TC-P(1)=0.4	TC-P(1)=0***	
Argentina	TC-P(2)=0.8	TC-P(2)=0***	
	AIC(2)= -5.688023	AIC(1)= -5.402182	AIC(2)= -4.506388
	BIC(1)= -5.490414	BIC(1)= -5.234409	BIC(2)= -4.246706
	HQC(1)= -5.591274	HQC(1)= -5.334558	HQC(2)= -4.393680
	DH(1)=7.25101e-035	DH(1)=1.68285e-057	DH(1)=3.97009e-008
	DH(2)=1.4876e-032		DH(2)=9.28355e-008
	LC-P(1)=0.1648	LC-P(1)=0.1602	LC-P(1)=0.1627
	LC-P(2)=0.1287	TC-P(1)=0.4	LC-P(2)=0.0895*
Chile	TC-P(1)=1		TC-P(1)=0.2
	TC-P(2)=0.7		TC-P(2)=0.3
	AIC(1)= -6.449839	AIC(1)= -6.252377	AIC(2)= -5.287065
	BIC(1)= -6.286446	BIC(1)= -6.090039	BIC(2)= -5.016502
	HQC(1)= -6.383865	HQC(1)= -6.186805	HQC(2)= -5.177778
	DH(1)=3.56607e-036	DH(1)=8.34424e-048	DH(2)=5.22607e-012
	LC-P(1)=0.1211	LC-P(1)=0.1115	LC-P(2)=0.1278
	TC-P(1)=0.8	TC-P(1)=0.4	TC-P(2)=0.4
Australia	AIC(1)= -6.415959	AIC(1)= -6.153847	AIC(2)= -5.1446
	BIC(1)= -6.252566	BIC(1)= -5.991504	BIC(1)= -4.9148
	HQC(1)= -6.349986	HQC(1)= -6.088275	HQC(2)= -5.03534
	DH(1)=6.75112e-058	DH(1)=1.40985e-082	DH(1)=3.15376e-012
			DH(2)=2.37223e-008
	LC-P(1)=0.2587	LC-P(1)=0.3402	LC-P(1)=0.1839
	TC-P(1)=0.4	TC-P(1)=0.3	LC-P(2)=0.1541
			TC-P(1)=0.9
		TC-P(2)=0.4	

The value within parenthesis is the order of the delay.
 AIC: Akaike criterion, BIC: Bayesian Schwartz criterion, HQC: Hannan–Quinn criterion, DH: Test for multivariate normality of residuals of Doornik–Hansen.
 LC: Linear cointegration (Johansen test).
 TC: Threshold cointegration (Hansen and Seo test).
 *Denotes significance at the 10% level.
 ***Denotes significance at the 1% level.

maintain competitive dynamics, a) within the Old World, b) within the New World and c) between the Old World and the New World.

Finally, we have used the Revolution R Enterprise 6.1 software to obtain statistical and non-linear econometric results, and Gretl and Eviews 6 for the linear.

3. Results

3.1. Econometric properties of the series: non-stationarity and cointegration

The first stage of the methodology consists of defining whether or not the series met the econometric requirements of integration. The variables have to be integrated of order one, I(1), that is, non-stationary at level but stationary at first difference. To test for stationarity of the variables, the Dickey and Fuller test (Dickey and Fuller, 1979, 1981) was used, and that of Ng and Perron (2001).

For all the series the null hypothesis of non-stationarity is accepted in levels and rejected in first differences. They are integrated variables of the first order, I(1), with the exception of the South African price series that proved to be stationary in levels, therefore it was excluded from the cointegration analysis. Table 1 shows the test results.

With the I(1) series, the next step consisted in contrasting whether they were linearly cointegrated by using the Johansen test (Johansen, 1988). In order to apply the Johansen test, first we need to define optimum lag length using the Hannan–Quinn information criterion (HQC). The results are confirmed with the Doornik and Hansen test (Doornik and Hansen, 1994).

Contrasts were applied to the two groups of countries: Old World (France, Italy and Spain) and New World (Argentina, Australia, Chile and USA). The Hannan–Quinn results indicate ($k=2$) for the system of Old World countries ($HQ=-0.811893$) and ($k=1$) for the New World ($HQ=-9.052701$). The correct specification of the two groups was confirmed with the contrast

Table 4

VEC Results de los pares cruzados: Italy –USA/Spain–USA/Spain–Argentina.

	Italy –USA				Spain–USA				Spain–Argentina			
	D(LIT)	Down D(LUSA)	D(LIT)	Up D(LUSA)	D(LES)	Down D(LUSA)	D(LES)	Up D(LUSA)	D(LES)	D(LARG)		
CointEq1	0.0034 (0.9163)	-0.0041 (0.8022)	0.7050 (0.2430)	0.0354 (0.9069)	CointEq1	-0.755*** (1.7e-05)	0.0059 (0.9171)	-0.4089* (0.0953)	0.0298 (0.7214)	CointEq1	-0.25750*** (0.0100)	-0.0459994** (0.0390)
D(LIT(-1))	-0.0411 (0.6970)	-0.0180 (0.7351)	0.0056 (0.9932)	-0.1638 (0.6228)	D(LES(-1))	0.0030 (0.9808)	0.0166 (0.6938)	-0.7058** (0.0049)	-0.0958 (0.2559)	D(LES(-1))	-0.263021** (0.0366)	-0.0311030 (0.2664)
D(LUSA(-1))	-0.2009 (0.3956)	-0.4682*** (0.0002)	12.286 (0.1623)	-0.1474 (0.7380)	D(LUSA(-1))	-0.0180 (0.9625)	-0.4794*** (0.0004)	11.164 (0.0665)	-0.3807 (0.0682)	D(LES(-2))	0.0329143 (0.7729)	0.0220483 (0.3903)
D(LIT(-2))	-0.0266 (0.8433)	0.0295 (0.6637)	0.2367 (0.2330)	0.0719 (0.4711)	D(LES(-2))	0.2168* (0.0364)	0.0114 (0.7447)	-0.3162 (0.1600)	0.0368 (0.6325)	D(ARG(-1))	-0.263030 (0.5778)	-0.181841* (0.0890)
D(LUSA(-2))	0.0011 (0.9961)	-0.0991 (0.3893)	-14.124 (0.1313)	-0.0620 (0.8947)	D(LUSA(-2))	0.0644 (0.8646)	-0.1233 (0.3429)	0.0868 (0.8951)	0.0983 (0.6638)	D(ARG(-2))	0.312463 (0.4890)	-0.120698 (0.2352)
C	0.0171 (0.1371)	0.0047 (0.4154)	-0.4566 (0.2058)	-0.0123 (0.9460)	C	-0.0248 (0.1986)	0.0077 (0.2466)	0.1987 (0.1280)	-0.0148 (0.7395)	C	0.409775** (0.0175)	0.0835814** (0.0304)
Cointegrating vector: (1, - 1.344116)				Cointegrating vector: (1, - 0.4657158)				R^2		0.268619	0.189670	
Threshold values: 0.5487169= w_{t-1}				Threshold values: 0.1749564= w_{t-1}				S.sq. resid		1153786	0.581636	
Percentage of observations in each regime 80% 20%				Percentage of observations in each regime 63.2% 36.8%				Durbin Watson		2007885	2048164	
AIC -1002.452 BIC -938.605 SSR 0.9512823				AIC -932.0447 BIC -868.1978 SSR 1.764306				Exclusion		p -Value	Coefficient	
Down: $\alpha_1=0.0034$, $\alpha_2=-0.0041$				Down: $\alpha_1=-0.755$, $\alpha_2=0.0059$				$\beta(1,1)$		0.000631	1	
Up: $\alpha_1=0.7050$, $\alpha_2=-0.0354$				Up: $\alpha_1=-0.4089$, $\alpha_2=0.0298$				$\beta(1,2)$		0.011582	1.463264339	
								Exogeneity		p -Value		
								$\lambda(1,1)$		0.010266	-0.257503	
								$\lambda(2, 1)$		0.039586	-0.0459994	

In parenthesis p -Value of t -statistics of coefficient estimates: * Denotes significance at the 10% level; ** Denotes significance at the 5%.

*** Denotes significance at the 1%. IT: Italy, ES: Spain, AR: Argentina

of Doornik and Hansen, with a p -Value lower than the level of significance of 5% (p -Value = $1.7626e-038$ and p -Value = 0.00723032 , respectively). Therefore, the conditions for contrasting the cointegration of the series were fulfilled.

Once lag length was defined the Johansen test was applied, specifically the trace test. The Johansen test (Johansen, 1988), for a level of significance of 5%, allowed accepting the null hypothesis of cointegration for the group of Old World countries (p -Value of 0.0146 and critical value 21.13162) and rejecting it for the New World countries (p -Value of 0.4260 and critical value 47.85613).

In short, the Old World countries belong in the same integration space and maintain a dependent price transfer dynamics. However, New World countries do not belong in the same space and the price dynamics observed in Old World countries are not seen; prices rather fluctuate in an independent way. In view of the results, it was decided to study the linear cointegration relationship between Old World countries and later, the relationship of crossed pairs between countries of the Old and the New World. Integration amongst New World countries is not studied given that, as explained before, this relationship does not take place.

3.2. Cointegration across Old World countries.

The linear cointegration relationship between Spain, France and Italy was estimated by the Maximum Likelihood method. The results are shown in Table 2. Following Gujarati (1995), one of the problems of this method is that the estimation results are difficult to interpret, thus it is restricted to the analysis of the significance of the estimated β and λ . The significance of parameters β and λ is shown with the contrast of exclusion and weak exogeneity, respectively. On the one hand, the contrast of exclusion found that coefficients β of the 3 countries were significant with a p -Value close to zero; this implies that the 3 are part of the same space of cointegration, determining a relationship of equilibrium between them. On the other hand, the contrast of weak exogeneity showed that the France and Italy markets ($\lambda(2, 1)$, $\lambda(3, 1)$) fulfill the condition of exogeneity (with a p -Value over 0.05; 0.875993 and 0.243085 respectively), but not Spain ($\lambda(1,1)$). Spain was the most dependent market (with a p -Value lower than 0.05, specifically 0.000162), adjusting to the shocks that are produced. Furthermore, in terms of France and Italy, France is in a leadership situation in the context of the EU given that according to the exclusion contrast the probability associated with the French variable $\lambda(2, 1)$, 0.875993, is higher than that associated with the Italian variable $\lambda(3, 1)$, with a value of 0.243085. Therefore, France is more independent than Italy, although both of them are independent with a probability over 0.05.

3.3. Cointegration between Old World and New World countries

The analysis is completed with the study of crossed pairs between Old World and New World countries, in order to gain a better perspective of how the integration dynamics works in the wine export market. To this end, the optimal delay that

relates them is calculated, in the first place (Table 3). Afterward, the linear and non-linear relationships were sought, through the Johansen test (Johansen, 1988) and the Hansen and Seo (2002), respectively (Table 3). The results of the Cointegration tests show that the countries most related in terms of price transfer are: 1) Italy and USA, 2) Spain and USA, and 3) Spain and Argentina.

The results of the estimation of the three pair of countries are presented below. The model that connects Italy–USA is a VEC of one threshold and two delays, based on the criterion of Residual Sum of Squares (RSS) with a value of 0.9512823 (with $k=1$ the RSS was 0.9819776). The result of estimation (Table 4) shows that the USA, with a negative sign for parameter α_2 , ($\alpha_2 = -0.0041$) in the Down regime, adjusts its prices when $w_{t-1} \leq 0.548$, although not significantly. That is, the USA attempts to seek competitiveness confronting Italy. When the differential is more than 0.548 points ($w_{t-1} > 0.548$) the interest for the competitor's price is reduced for both countries, possibly generating an imbalance process in the c/p (positive sign of the α_1 , α_2 , of D(LIT) and D(LUSA)), although not significant. Italy's reaction, with a higher α is greater than the USA's.

The VEC model between Spain–USA with two delays, 1 threshold is the one that better adjusts in face of the one with 1 delay and 1 threshold (for $k=1$ the RSS was 1.90789 and for $k=2$ the RSS was 1.764306). Spain seeks competitiveness in face of the USA in the Down regime ($\alpha_1 = -0.755$) and in the Up regime ($\alpha_1 = -0.4089$), the first parameter is significant at 1% and the second at 10% (Table 4).

Finally, the VEC model between Spain and Argentina shows two integrated markets, with homogeneous prices, adjustment of possible imbalances of the prices in the short term and equilibrium in the l/p (Table 4). The contrast of exclusion found that the β coefficients of the 2 countries were significant with a p -Value close to zero (Table 4); this means that Spain and Argentina are part of the same space of cointegration, determining an equilibrium relationship between them. The contrast of weak exogeneity (Table 4) showed that no market fulfills the condition of exogeneity, no country is found in a situation of predominance over the other in price transmission. Spain and Argentina follow the same trend in price dynamics, fundamentally because they are specialized in a low range wine. They both adjust to price imbalances.

4. Discussion

The preceding results reveal that Old World and New World countries follow different trends in the transfer of prices linked to various productive and commercial strategies. These conclusions are in line with those in Campbell (2000), Anderson (2001), Green and Pierbattisti (2002), Anderson, Norman and Wittwer (2003) and Villanueva (2011). In spite of normally being considered a commercial block, New World countries, unlike Old World countries, do not share common behavior in their exporting dynamics as a result of their different commercial positioning strategies and sale prices, as seen in Villanueva (2011).

OW countries have a common export wine price dynamic; that said, France is in a position of leadership followed by Italy. A similar conclusion was obtained by Bentzen and Smith (2002) and Triguero (2002), with these three countries and the wine market, and where France is the most independent market of the three countries. On the other hand, Spain is the most dependent market and adjusts itself to price variations as they happen. However, in the results by Bentzen and Smith (2002), Spain would not have been so dependent on France and Italy in past decades.

On the other hand, although France is the “leader”, it presents a dynamic that is not followed by New World countries, because of its specialization in wines of the Premium segments. Surprisingly, it is Italy and Spain that are cointegrated, linear and non-linearly, with markets of New World countries, especially USA and Argentina. The relationship between Spain–USA is similar to that of Italy–USA in the sense that the relationship between their prices is non-linear, that is, prices need to reach a certain threshold before the other market reacts. The relationship between Spain and Argentina, on the other hand, is linear. Therefore, the reaction of one country in the face of price variations in the other one takes place regardless of the threshold reached.

Prices in Italy and USA follow homogeneous trends in the long term, but in the short term the reactions to prices are asymmetrical, possibly allowing price imbalances. USA attempts to directly seek competitiveness against Italy. The degree of relationship between these two markets is in accordance with the degree of integration that agrarian markets have in the USA and Italy, which has been estimated in other studies (Vasciaveo and Rosa, 2012). On the other hand, Spain attempts to directly seek competitiveness against USA, fundamentally to penetrate its market and the English-speaking profile. Italy is not that sensitive to price variation in the USA. In this same line are the results obtained by Thach and Cuellar (2007) when they point out that the price of Spanish wine is very sensitive to changes in the USA price, although also to the French and Italian.

Lastly, Spain and Argentina are two integrated markets, with homogenous prices, adjustments for possible price imbalances in the short term and equilibrium in the $1/p$, given that both countries compete strongly in the lower range wines, sold in bulk (with containers that start at 2 l) (Villanueva 2011).

5. Conclusions

To conclude, it is safe to state that for the period studied and according to the econometric technique used, that the international wine market follows two different paths. On one hand, the OW countries represent an integrated market given that, even in spite of the price adjustment dynamics that might take place in the short and medium term, eventually a trend towards balance is observed and on the other hand, the wine market of the NW exporters do not represent an integrated market.

France, Italy and Spain follow a common exporting dynamic, sharing the same space of cointegration and adjusting their prices in the long term in face of deviations that may

occur. France, followed by Italy, leads the wine market in the EU. And although they manifest an asymmetry in the behavior of their prices in the short term, they do not provoke price imbalance processes in the wine sector. New World countries, including USA, do not share a common behavior in their exporting dynamic, because of their different principal axes of target countries in their destination markets: USA is directed towards Canada and Asian countries, Australia towards the United Kingdom, Chile towards UK and Continental Europe, Argentina towards USA, etc. Within this group, it has been USA that proves to be the most elastic market in adjusting its prices to the standard international dynamics.

Interestingly, although there is no convergence, some wine segments, such as cask wine as a commodity, explain the dynamics of old markets like Spain and Argentina. But the most important aspect is the creation of an integrated market in the traditional EU producer countries. In short, the integration between OW countries confirmed by our results is largely a consequence – in line with Sanjuan and Gil (1997) – of a common policy with common regulations and objectives which benefits the whole group of countries when it comes to competing with other countries such as Australia or Chile, or in the case of the USA, where the possibilities for the development of the wine sector are high in view of the production capacity and the large domestic market there. Thus, the union and synchronization of the wine market represents a substantial advance. This characteristic is not observed in the New World countries, which have different policies and objectives which result in a non-integrated wine market, not even in the potential derivations that might have emerged from the Commonwealth commercial practices.

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