Is Wine a Financial Parachute?

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Abstract

This paper analyzes the relationship between Global Wine Industry Share Price Indexes and composite stock market indexes using a Threshold Vector Error Correction Model (TVECM), aiming to investigate if investments in the wine sector play a role in determining financial risk and return to investors who include it in their portfolio. Whilst in most of the literature analyses the return of investments of fine wine, this paper places the focus to "normal" (i.e. non-fine) wine, using data from the Mediobanca database covering companies in the wine industry listed on regulated stock market in France, US, Australia, Chile and China . The dataset cover the time period going from January 1, 2001, to the end of February 2009.

The estimates of the TVECM lead to the following results: i) in more mature markets, like France and the US, the presence of a threshold in the relationship between wine index and composite index permit informed investors to make gainful investments; ii) in less mature markets, like Chile and China, there is evidence suggest that wine is not used as a financial parachute.

Jel Code: *Q11, G14, C32*

Keywords: *Wine sector, Stock Market, Threshold Cointegration*

1 Introduction

Increasing interest in alternative investments has motivated fields of studies aimed at understanding the return and risk characteristics of stock prices in these markets.

Among alternative investments, a growing interest in the wine market has been noticed. In particular, fine wine, produced by the most prestigious estates in famous areas, have attracted specific attention due to its desirable market characteristics such as low correlations with traditional stocks, giving the benefits of a portfolio diversification.

Similarly, another area of research as interesting as understudied is the analysis of wine share prices, which represent a possible financial benchmark of the wine sector as a whole. Since the work refers to non-fine wine, this will be referrer to as "normal" wine in the remaining part of the article. A better understanding of the use of normal wine as a way to diversify risk may be important not only from the perspective of investors, but also for the wine industry as a whole, which has shown dramatic changes in recent decades. In fact, while historically the wine market was dominated by European countries (often referred to as Old World), since the beginning of the 1990s new producing countries have found their way into the market, showing strong competitive potential thanks to their innovative strategies in production and trade (Campbell and Guibert, 2006). Europe (in particular France, Italy Germany and Spain) still occupies a leading position on the world wine market, accounting globally for 49% of growing areas and 63% of wine production (data from the Fao databank for the year 2007). However, wine is currently produced in Argentina (accounting for 9% of world production), USA (8%), China (5%), Australia (4%), South Africa (4%) and Chile (3%). Contrary to many traditionally wine growing countries, where current production is 25% less compared to the 1990s, “New World” countries have registered astonishing rates of growth, at time with extraordinary speed (like the case of China), entering not only the lower quality segment, but reaching up to the medium-high segment, once exclusive domain of traditional long-established producers (Aylward, 2003; Aylward and Turpin, 2003).

The aim of this paper is to analyze the long-run relationship between wine share price indexes and general stock market indexes, enquiring about their causal relationship and their different speed of adjustment to the long-run equilibrium. In particular, the goal is to investigate if normal wine can act as a financial parachute, that is an investment that can bring benefits in terms of risk and and return to investors’ financial portfolios.

To achieve this objective, the paper makes use of the Mediobanca Global Wine Industry Share Price Indexes and the composite stock market indexes for a selection of countries - France, United States, Australia, Chile, China - where wine shares are listed. The Mediobanca Wine Indexes cover companies operating in the wine industry and listed on stock markets worldwide. These data are analysed using threshold cointegration to investigate the presence of asymmetric dynamic adjusting processes between these indexes. Non-linear adjustment allows prices to adjust in a different way to large or small deviations from the long-run equilibrium level. This is particularly suitable in the presence of market frictions, where traders act on the market only when expected profits exceed costs. In this sense, the threshold cointegration constitutes an adequate specification, since the error correction mechanism is active only when the fluctuation away from equilibrium is above a certain limit (the threshold).

The novelty in this work is threefold. Firstly, the focus of the analysis is not on *fine* wine, as in most of the current literature, but on *normal* wine to analyse investment opportunities. Secondly, the threshold cointegration methodology is applied to the wine sector: to the authors’ knowledge, in fact, no previous study has investigated the long-term dynamics of the share price of wine companies and of the whole stock market. However, such an analysis is relevant since it enables to obtain a better understanding of wine share prices adjustments, and it allows a better understanding of financial investment opportunities in this market segment. Finally, the paper presents for the first time the Mediobanca Global Wine Industry Share Price Indexes in an academic context, presenting this databank and the use the environment could use.

The paper is organized as follows. Section 2 describes the theoretical framework. Section 3 outlines the econometric methodology. Section 4 presents the data set used to the purpose of the analysis. Section 5 develops the empirical results and Section 6 concludes the paper.

2 Theoretical Framework

The wine economic literature presents a wide range of interesting studies that have analysed the potential of wine as a financial investment (Fogarty, 2006, presents a well detailed overview on the subject). The most investigated subject focused on the estimation of the rate of return of wines, comparing the value to other common assets, both in the mean value and in conditional volatility or covariance (among others, Krasker, 1979; Weil, 1993; Burton and Jacobsen, 2001; Sanning et al., 2007). This literature always refers to fine and rare wines, using auction data of specific wines or some composite indexes (e.g. *LiveEx*). Within these studies, French fine wines are the most commonly analysed, together with the Australian high quality production. Economist have then redirected their attention examining the topic exploring the investment potential of wine within certain portfolio strategies. Within this stream of the literature, empirical results and financial recommendations are mixed and relate to many factors, such as prices (Jaeger, 1981; Weil, 1993; Fogarty, 2006), buyer's premium (De Vittorio and Ginsburgh, 1996), speculative bubbles (Jovanovic, 2007), excellence of vintage and respective ranking (Jones and Storchmann, 2001; Masset and Henderson, 2008) and fluctuations in inventories (Bukenya and Labys, 2007). Despite the extensive empirical literature on the wine market, there seem to be no study on the long-term dynamics of share prices of *normal* wine companies and the general trend of the stock market, with the intent of considering the wine market a possible alternative investment.

From a methodological standpoint, many academic studies analyze the interdependence between stock markets, their causal relationship, and the speed of adjustment to the long-run equilibrium. These studies are generally conducted in a framework of cointegration analysis and/or threshold cointegration analysis. The cointegration concept has been introduced by Granger in 1981. Evidence of cointegration among several indexes of stock prices suggests that series have the tendency to move together in the long-run even if experiencing short-term deviations from their common equilibrium path (Masih and Masih 1997, Patra and Poshakwale 2008).

Within financial studies, testing for cointegration is relevant with respect to the issue of portfolio diversification: the existence of cointegration implies that in the long run two series prices move jointly. In this case, there maybe little benefit in including both series in a portfolio, since the common behavioural trend limits the advantages of a diversification. In contrast, lack of cointegration indicates the potential for significant long-run benefits due to a reduction of risk without loss in the expected return (Berument, Akdi and Atakan 2005, Ratner 1996, Squalli 2007).

Testing for cointegration is also relevant in view of the fact that if two economic time series are cointegrated, there must be a causal relationship in at least one direction. This implies that movements of one series can be used to predict fluctuations of the other: in other words, it is possible to anticipate the evolution of the dynamic of a stock market index while knowing that of another stock market index. In this context, it is possible to test efficiency hypothesis[1], to study stock prices adjustment dynamics and to investigate the opportunities of financial investments. In simpler words, if there is no efficiency active traders can anticipate price movements over the short run (Siourounis 2002).

Since efficiency hypothesis assumes no transaction costs, free and symmetric information, as well as rational investors, studying stock prices and efficiency using linear cointegration techniques corresponds to the assumption of symmetric, linear and continuous stock prices adjustment dynamics. These set of assumption seem to be very constraining, since markets present frictions such as transaction costs, noise traders and imitative behaviour, and this can imply adjustment price dynamics towards fundamental values which are, discontinuous and nonlinear (Enders and Siklos 2001, Shively 2003, Prat and Jawadi 2008).

To address these limitations, part of the literature extends linear modelling to the nonlinear case by adopting the threshold cointegration, following the seminal paper of Balke and Fomby (1997). This econometric technique allows for non-linear adjustments in the long-run equilibrium (Perez-Quiros and Timmermann 2000, Maasoumi and Racine 2002, Anderson 1997).

The economic rationale for considering the possibility of a non-linear rather than a linear type of adjustment to the long-run equilibrium is that the first allows prices to adjust in a different way to large or small deviations from the long-run equilibrium level. This implies that the dynamic behaviour of the rate of return differs according to the size of the deviation. In fact, this methodology captures those adjustments that are active only when deviations from the equilibrium exceed a threshold, which is often represented by transaction costs (Jawadi and Koubaa 2004, Aslandis and Kouretas 2005, Sercu et al. 1995). In fact, traders may not act immediately as prices move, due to the possibility of "mis-price deepening" (Shleifer 2000), but they act only when the expected profits exceed the costs. In this sense, the threshold cointegration constitutes an adequate specification, since the error correction mechanism is active only above a certain size of the variation compared to the equilibrium.

In other words, in the linear cointegration approach the adjustment parameters are assumed to be constant within the period analysed, while in the threshold cointegration the error correction terms (ECTs) are inactive when the value is inside a given range, but are active above a certain threshold. When the deviation from equilibrium is above the critical threshold, agents enter to the market to implement profitable arbitrage activities, moving the system back to the equilibrium (McMillan, 2003 and 2005).

3. Econometric methodology

An extensive literature has applied cointegration techniques to investigate if long-run *equilibria* among prices exist. These traditional models assume that the adjustment process to maintain the *equilibrium* occur at every time period. However, many situations, and, in

1. According to Fama (1965) in an efficient market all available information is instantaneously and completely reflected in stock prices. Thus, it is not possible to forecast future price evolution on the basis of previous stock prices variations because this information is already integrated in the present price.

particular the commodity price stabilisation, are often characterized by discrete interventions. Recently, two main classes of models have been proposed in the literature to characterise this kind of non-linear adjustment process. One class considers Markov-Switching Vector Error Correction models, assigning probabilities to the occurrence of different regimes (Hamilton, 1989; Krolzig, 1997). The second class is based on Tong and Lim's (1980) approach using Self-Exciting Autoregressive Model where the regimes that have occurred in the past and the present are known with certainty, where "certainty" is established using statistical techniques. In this context, Balke and Fomby (1997) introduced the concept of "threshold cointegration", a feasible approach that allows the adjustment process to move differently in separate regimes. They hypothesised that this movement towards a long-run equilibrium may not occur in every time period, but only when the deviation from equilibrium exceeded a critical threshold, hence its name. In this sense, cointegration can be considered as a *global* characteristic of the series, while threshold behaviour as *local* and discrete characteristic.

The model used in this paper is a threshold vector error correction model (TVECM), with a threshold effect based on an error correction term. In the case of two regimes, Balke and Fomby (1997) present a TVECM of order L+1 that takes the form:

$$\Delta x_t = \begin{Bmatrix} A_1' X_{t-1}(\beta) + u_t, & if\ w_{t-1}(\beta) \leq \gamma & regime1 \\ A_2' X_{t-1}(\beta) + u_t, & if\ w_{t-1}(\beta) > \gamma & regime2 \end{Bmatrix} \quad [1]$$

where

$$X_{t-1}(\beta) = \begin{Bmatrix} 1 \\ w_{t-1}(\beta) \\ \Delta x_{t-1} \\ \Delta x_{t-2} \\ \vdots \\ \Delta x_{t-l} \end{Bmatrix} \quad [2]$$

and x_t is a *p*-dimensional time series I(1) cointegrated with one *(p* x *1)* cointegrating vector *b*, $w_t(b)$ is the ECT, u_t is the error term assumed to be an *iid* Gaussian sequence with a finite covariance matrix. A_1 and A_2 are matrices of coefficients describing the dynamics in each regime, while *g* is the threshold parameter. The values of w_{t-1} below or above the threshold *g* allow the coefficients to switch between regimes 1 and 2; in particular, the estimated coefficients of w_{t-1} of each regime denote the different adjustment speeds of the series towards equilibrium.

Hansen and Seo (2002) provided an estimation method for TVECM via maximum likelihood, which involves a joint grid search over the threshold parameter and cointegrating vector. In order to test for threshold cointegration, Tsay (1989, 1998) proposed non-parametric non-linearity tests, while Andrews (1993), Hansen (1996), Balke and Fomby (1997) and Lo and

Zivot (2001) presented different methods of estimation based on the Lagrange Multiplier (LM) statistics. More recently, Hansen and Seo (2002) developed two SupLM (Supremum Lagrange Multiplier) tests for a given or estimated *b* using a parametric bootstrap method to calculate asymptotic critical values with the respective *p*-values. The first test is denoted as:

$$\sup LM^0 = \sup_{\gamma_L \le \gamma \le \gamma_U} LM(\beta_0, \gamma)$$

and would be used when the true cointegrating vector *b* is known *a priori*. The second test is used when the true cointegrating vector $\widetilde{\beta}$ is unknown and the test statistic in this more general case corresponds to:

$$\sup LM = \sup_{\gamma_L \le \gamma \le \gamma_U} LM(\widetilde{\beta}, \gamma)$$

where $\widetilde{\beta}$ is the null estimate of the cointegrating vector. In these tests, the search region [g_L, g_U] is set so that g_L is the p_0 percentile of $\widetilde{w}_{t-1}$, where $\widetilde{w}_{t-1} = w_{t-1}(\widetilde{\beta})$, and g_U is the (1-p_0) percentile[1].

4 The Data Set

The analysis presented in the paper makes use of data on the wine share price index and the composite stock market index of the stock exchange for five countries: France, US, Australia, Chile and China. The dataset covers the period starting on January 1, 2001 up to the end of February 2009. All series are expressed in euro and appear in the econometric model in logarithmic form. The wine series is the Mediobanca Global Wine Industry Share Price Index from Mediobanca[2], which covers companies operating in the wine industry, listed on regulated stock markets and quoted for at least six months. Prices are computed daily and represent a financial benchmark of wine, measuring and monitoring the dynamic of risk and return of wine stocks. The index is calculated for each of those countries whose stock had traded at least three titles that meet some specific selection criteria[3].

1. Andrews (1993) argued that setting p_0 between 0.05 and 0.15 is a generally good choice.
2. http://www.mbres.it/
3. The Mediobanca indexes include wine companies selected according to the following characteristics: companies listed on regulated markets; series of quotes at least six months; at least 50% of revenues must come from initiating wine; commitment as direct management in the production cycle. The panel index is comprised of 42 stocks and has an aggregate market capitalization of €14.3bn.

Data on the composite stock market series are daily prices supplied by Datastream, and represent the performance of the whole stock market for a given country. Specifically, data is for the French CAC40 index, the US S&P500 index, the Australian S&P/ASX200 index, the Chilean IPSA index, and the Chinese SSE index[1].

All indexes are "capitalization-weighted", that is the components are weighted according to the total market-value of their outstanding shares.
Both series are "price" indexes, expressive of the dynamics of stock prices alone and without the component of income represented by the distribution of dividends. "Total return" indexes, which also include dividends, are available for all series, but the pure price index is preferred. The rationale of this choice is that the dividend policy adopted by each company is not relevant in the analysis presented here, as in general dividends do not reveal the level of volatility that would be necessary to influence the null hypothesis of "no cointegration" among a set of share price indices (Dwyer and Wallace 1992, Subramianan 2009).

5 Empirical Results

Considering cointegration as a global characteristic of the series while threshold behaviour as local characteristic (Balke and Fomby, 1997), the analysis consists of several steps. Firstly, the degree of integration of the variables is tested via the Augmented-Dickey Fuller test (ADF), and the Philips-Perron test (PP). Subsequently, cointegration (Johansen, 1988; Johansen and Juselius, 1990) and Granger causality (Granger, 1969) between the prices pairs (wine and composite index) are tested for each country analysed. The following step entails a test for the presence of threshold cointegration. Finally, TVECM is run using the Hansen and Seo (2002) procedure. Table 1 shows the results of the ADF and PP tests, were Δ in front the variable name indicates the differentiated series. It emerges that all the series are I(1) with and without trend.

1. CAC40 is the benchmark French stock market index and includes the 40 most significant stocks in terms of liquidity. The S&P500 includes the prices of 500 large-cap common stocks actively traded on the two largest American stock markets, NYSE and NASDAQ. The S&P/ASX200 index is the stock market index of Australian stocks listed on the Australian Securities Exchange. The IPSA is a stock market index composed of the 40 stocks with the highest average annual trading volume in the Santiago Stock Exchange; finally, the SSE is the composite index from the Shanghai Stock Exchange.

Table 1. Test for unit root and stationary*

		ADF	PP	ADF	PP
		no trend		with trend	
FRANCE	Wine	-0.803	-0.866	0.887	0.371
	? Wine	-43.223	-43.858	-43.248	-43.870
	Composite	-1.360	-1.110	-1.329	-1.060
	? Composite	-48.517	-48.975	-48.508	-48.967
USA	Wine	-1.869	-1.855	-0.604	-0.522
	? Wine	-46.838	-46.846	-46.922	-46.940
	Composite	-1.306	-0.877	-1.734	-1.298
	? Composite	-48.517	-48.975	-48.508	-48.967
CHILE	Wine	-2.312	-2.304	-2.160	-2.432
	? Wine	-42.741	-43.048	-42.767	-43.063
	Composite	-0.770	-0.895	-1.508	-1.713
	? Composite	-38.502	-38.390	-38.493	-38.381
CHINA	Wine	-0.561	-0.561	-1.502	-1.503
	? Wine	-44.661	-44.638	-44.659	-44.636
	Composite	-1.098	-1.130	-1.205	-1.230
	? Composite	-46.186	-46.211	-46.229	-46.248
AUSTRALIA	Wine	-1.904	-1.817	-2.442	-2.331
	? Wine	-45.599	-45.665	-45.588	-45.653
	Composite	-0.980	-0.952	0.191	0.294
	? Composite	-45.995	-46.007	-46.032	-46.048

**1% critical value: ADF and PP -3.430; ADF and PP with trend -3.960.*

Since the prices series have a unit root, the presence of cointegration between the series can be tested following the Johansen approach, using the Trace and Maximum-Eigenvalue tests. Both tests were conducted including an intercept in the cointegrating equations and estimating the model with a linear trend. The results in table 2 indicate the presence of linear cointegration relationship only in France. In the other country the results indicate the absence of a cointegration vector at 0.05 critical value, leading to the conclusion that in the United States, Chile, China and Australia wine share price indexes and composite stock market indexes have a unlikely long-term linear relationship.

Table2. Cointegration test between wine and composite index

Series	Hypothesized No. of CE(s)	Trace test	0.05 critical value	Max-Eigen test	0.05 critical value
FRANCE	None	23.735	15.410	22.640	14.070
	At most 1	1.097	3.760	1.097	3.760
USA	None	6.591	15.410	6.290	14.070
	At most 1	0.301	3.760	0.301	3.760
CHILE	None	12.227	15.410	10.363	14.070
	At most 1	1.864	3.760	1.864	3.760
CHINA	None	8.124	15.410	5.730	14.070
	At most 1	2.394	3.760	2.394	3.760
AUSTRALIA	None	6.882	15.410	6.270	14.070
	At most 1	0.612	3.760	0.612	3.760

Lag(s) interval: lag=1 for China and Australia, lag=2 for France, United States and Chile (selected by Akaike Information Criterion in VAR). *Trend assumption: linear deterministic trend.*

In order to find which price is unresponsive to deviations from a long run relationship, causality is tested using the Granger approach (Granger, 1969). The Granger causality Wald test, reported in Table 3, highlights that the composite stock market index Granger-causes the wine share price index in France, United States, and Chile, while Australia shows a significance level just above 0.10.

In the case of China, the tests seem to show that the price relationship has no clear causality relationships between variables. This result could be due to the structure of the Chinese financial market, which is a substantially closed market, as confirmed by the financial indicator provided by the Institutional Profiles Database (CEPII, 2009). In fact, in the period considered in this study the Chinese market exhibited a low level of financial openness (tab. 4). As a matter of comparison, it's possible to notice that the three developed economies (France, United States and Australia) and the two developing countries (Chile and China) have a substantial difference in the degree of openness.

Table 3. Results of the Granger causality test between wine and composite index

Null Hypothesis	FRANCE			USA			CHILE			CHINA			AUSTRALIA		
	χ^2	*df*	*p-value*	χ^2	*df*	*p-value*	χ^2	*df*	*p-value*	χ^2	*df*	*p-value*	χ^2	*df*	*p-value*
Comp. does not Granger cause wine	55.186	2	*0.000*	5.237	2	*0.073*	20.072	2	*0.000*	3.343	1	*0.067*	2.527	1	*0.112*
Wine does not Granger cause comp.	2.568	2	*0.277*	0.060	2	*0.970*	2.497	2	*0.287*	4.524	1	*0.033*	1.048	1	*0.306*

Table 4. Capital market: financial openness to the outside world

	2001	2006	2009
FRANCE	3.6	3.6	3.6
USA	3.5	3.6	3.6
CHILE	1.0	3.4	2.8
CHINA	1.6	1.9	1.6
AUSTRALIA	*na*	*na*	3.2

Source: CEPII- Institutional Profile Database

0 = prohibited. If authorised, from 1 = authorisation necessary to 3 = simple declaration and 4 = no declaration

In order to empirically investigate the opportunity of financial investment in wine shares, we perform a threshold cointegration analysis. As already pointed out, this approach appears more appropriate, since traders act on the market only when the deviation from long run equilibrium is above a critical threshold. The presence of a threshold was estimated via the application of the Hansen and Seo (2002) SupLM test (when β is estimated) using a parametric bootstrap method with 3,000 replications. The results of the tests are reported on table 5. The residual bootstrap value of SupLM test provides evidence of the presence of threshold cointegration for all the case studied except for Australia.
The robustness of the TVECMs results are also supported by the rejection of the null of the equality of ECT coefficients between the two regimes detected. Apart from the Australian case of no threshold cointegration, the p-value of Wald test is significant for all countries.

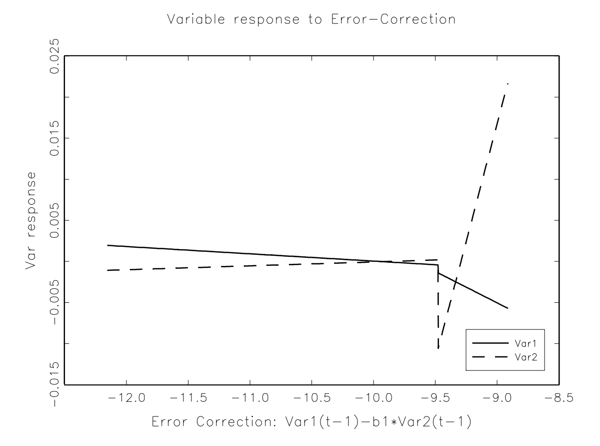
Table 5. Threshold cointegration test

	FRANCE	USA	CHILE	CHINA	AUSTRALIA
Test statistic value (Sup LM)	23.178	24.500	25.282	20.650	15.177
- *Residual bootstrap value*	*0.066*	*0.040*	*0.049*	*0.030*	*0.133*
Threshold value	-9.477	0.284	3.480	-1.348	
Estimate of the cointegration vector	3.624	1.212	0.381	1.562	
Wald test for equality of ECM coefficient	8.231	7.242	5.416	10.736	
- *p-value*	*0.016*	*0.027*	*0.067*	*0.005*	

The threshold value identified in the French series detects the presence of two regimes with different adjustment speed in the long run equilibrium. Table 6 reports the estimated coefficients for the TVECMs and the related graphs that exhibit the error correction effect i.e.: the estimated regression functions of wine and composite index as a function of ECT, holding the other variables constant. The first regime, defined as *usual regime*, include the majority (94%) of the observations, while the second, defined as *unusual*, the remaining 6% observations. As we can see in the figure in the usual regime the ECT coefficient are quite close to zero, indicating that the variable are close to a random walk.
In the unusual regime the speed of the adjustment coefficient of the composite index (CAC40) is significant and higher with respect to the wine index. In particular, when the gap between the two prices series exceed a critical threshold (γ>-9.477) the domestic stock market index response in restoring the long run equilibrium is seven time faster than the wine share price index. Therefore, considering that the long run relationship is governed by the composite index, as previously outlined by the Granger causality test, the different speed of adjustment could be profitably used from investors. Hence, when the price gap is over a critical threshold, informed investors operating in the wine sector exploiting market inefficiency can make gainful investments just looking at the prices adjustment dynamics of the domestic stock market.

Table 6. Threshold VECMs between France Wine index and CAC40 composite index

FRANCE				
	Usual regime (94% of obs.)		Unusual regime (6% of obs.)	
	Wine	Comp.	Wine	Comp.
W t-1	-0.001	0.000	-0.008	0.057
	-1.830	*0.696*	*-0.520*	*2.480*
Intercept	-0.009	0.005	-0.074	0.533
	-1.730	*0.639*	*-0.538*	*2.466*
ΔWine t-1	-0.009	-0.013	0.037	-0.143
	-0.315	*-0.376*	*0.330*	*-0.757*
ΔWine t-2	0.000	0.014	0.273	0.166
	-0.012	*0.347*	*2.070*	*0.768*
ΔComposite t-1	0.080	-0.076	0.160	0.143
	3.541	*-2.504*	*2.665*	*1.455*
ΔComposite t-2	0.037	-0.016	0.020	-0.090
	1.795	*-0.466*	*0.263*	*-0.946*

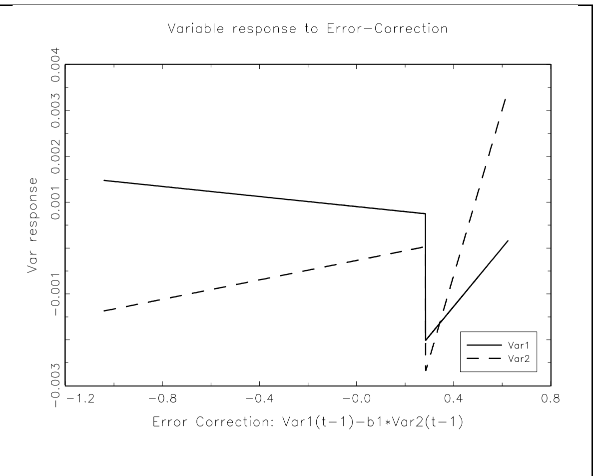


Note: Eicker-White standard errors are reported in italics

Similar considerations to those relating to the French case could be formulated for the United States, whose TVECMs results are reports in Table 7. Here the usual regime include 61% of observations and, like in France, it's close to a random walk. Only when the price gap is over a critical threshold the adjustment coefficient becomes active in restoring the long-run equilibrium Granger caused by the composite index. In contrast with the findings on France, in the United States the speed of adjustment of the composite index to the long run equilibrium is slower, but the adjustment process involves substantially more observations (39%). On the other hand, the composite index is three time faster than the wine share price index response to the disequilibrium. Hence, also in the United States there is a boundary of profitable arbitrage in managing wine share price indexes. In particular, in the United States the differences in the adjustment speed are smaller but more frequent than in France. Consequently, agents have more opportunities to make profitable investment, but with a shorter operating time span.

Table 7. Threshold VECMs between Nord America Wine index and S&P500 composite index

USA				
	Usual regime (61% of obs.)		Unusual regime (39% of obs.)	
	Wine	Comp.	Wine	Comp.
W t-1	-0.001	0.001	0.006	0.018
	-0.503	*1.039*	*0.790*	*2.811*
Intercept	0.001	0.000	-0.004	-0.008
	1.821	*-0.635*	*-1.176*	*-3.059*
ΔWine t-1	-0.005	0.000	0.015	0.005
	-0.113	*-0.008*	*0.308*	*0.111*
ΔWine t-2	0.019	-0.004	0.033	0.006
	0.530	*-0.108*	*0.687*	*0.159*
ΔComposite t-1	-0.063	-0.103	-0.082	-0.214
	-1.804	*-2.824*	*-1.235*	*-3.886*
ΔComposite t-2	0.029	-0.026	-0.250	-0.115
	0.665	*-0.656*	*-2.912*	*-1.320*

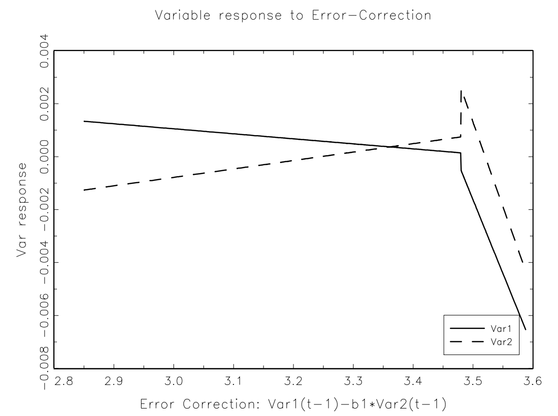


Note: Eicker-White standard errors are reported in italics

The findings on the France and the United States differ from those related to the two developing countries analysed here, whose TVECMs results appear in Table 8 and 9. In Chile the unusual regime starts as the a critical threshold of 3.48, but this regards only 10% of observations, while in China, where the threshold is -1.35, the usual regime includes 39% of observations. In both countries the ECT of the usual regime exhibit little significances level and minimal dynamics, whilst becoming significant for both indexes in the unusual regime.
In the case of Chile, the coefficient of the speed of adjustment of the composite index is a little larger than the the wine coefficient, providing evidence of a reduced profitable space for investment. In China, were most of the shares are held by Chinese retail investors, the results need to be interpreted with caution, due to the low degree of market openness to foreign investment discussed earlier in the paper. Nevertheless, the TVEC models give similar and significant ECT coefficients in the unusual regime for both series, showing no space for arbitrage, hence no profitable investments.

Table 8. Threshold VECMs between Chile Wine index and IPSA composite index

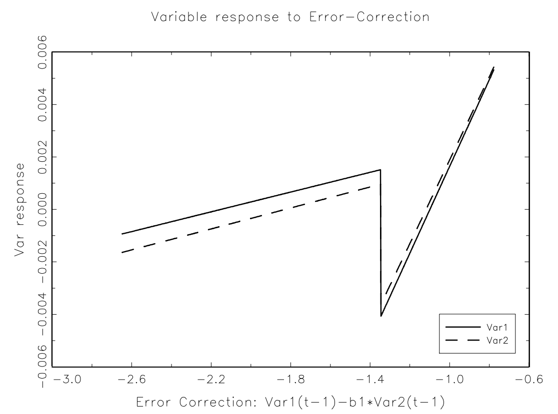
CHILE				
	Usual regime (90% of obs.)		Unusual regime (10% of obs.)	
	Wine	Comp.	Wine	Comp.
W t-1	-0.002	0.003	-0.056	-0.064
	-1.151	*1.511*	*-1.723*	*-1.933*
Intercept	0.007	-0.010	0.193	0.225
	1.253	*-1.501*	*1.705*	*1.941*
ΔWine t-1	0.028	0.013	0.156	-0.096
	0.858	*0.330*	*1.642*	*-1.196*
ΔWine t-2	0.069	0.100	0.059	0.087
	2.170	*2.378*	*0.561*	*1.258*
ΔComposite t-1	0.064	0.187	0.193	0.224
	2.942	*5.319*	*1.695*	*3.390*
ΔComposite t-2	0.017	-0.080	-0.300	-0.144
	0.755	*-2.018*	*-3.003*	*-1.593*



Note: Eicker-White standard errors are reported in italics

Table 9. Threshold VECMs between China Wine index and SSE composite index

CHINA				
	Usual regime (68% of obs.)		Unusual regime (32% of obs.)	
	Wine	Comp.	Wine	Comp.
W t-1	0.002	0.002	0.017	0.016
	1.305	*1.258*	*3.490*	*3.270*
Intercept	0.004	0.004	0.018	0.018
	1.319	*1.055*	*3.509*	*3.539*
ΔWine t-1	-0.048	-0.009	0.198	0.084
	-1.189	*-0.200*	*3.226*	*1.460*
ΔComposite t-1	0.042	0.025	-0.169	-0.100
	0.909	*0.562*	*-2.997*	*-1.812*



Note: Eicker-White standard errors are reported in italics

6 Conclusion

This paper makes use of the Mediobanca Global Wine Industry Share Price index with the aim to consider the wine market like a possible alternative investment. The analyses regard 5 wine producing countries: France, US, Australia, Chile and China. The period considered goes from January 1, 2001 to the end of February 2009.

Specifically the purpose of this paper is to investigate the long-run relationships between wine share price indexes and stock market indexes in the same wine producing countries. This is done using non-linear cointegration to capture price adjustments, which are active when deviations from equilibrium values exceed some threshold.

The results show that in more mature markets (France and US), when the gap between wine index and composite index exceeds a critical threshold, wine plays the role of a financial parachute, since the speed of adjustment of the wine index is lower than that of the composite index. This means that wine price deviations from equilibrium last longer time. Considering that the long-run relationship is Granger-caused by the composite index, due to a weak-form efficiency and different speed of adjustments, informed traders can anticipate wine price movements over the short-run and make profitable investments. These results identify wine shares as an attractive source of investment.

In less mature markets (Chile and China), wine index and composite index are non-linearly cointegrated, but this time with the same speed of adjustment. Although results may need to be interpreted with caution, these different results are likely to be the consequence of the different economic situation that characterises the different countries in the analysis, which include a different level of development of financial markets, and a different level of market openness outlined earlier in the paper. In fact, as already observed by Erb, Harvey and Viskanta (1997) and Garten (1997), in general emerging markets are complex and a proper understanding of the dynamics they experience hinges upon many factors. In particular, in an emerging context financial markets may be thin: their size may be comparatively small in terms of market capitalization, number of listed companies and trading volumes. Furthermore, they may be characterized by a different level of free-market capitalism, democracy, as well as other specific factors that characterise the economic and political context of the countries in analysis.

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