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RATIONAL SPECULATIVE BUBBLES IN THE FINE WINE INVESTMENT MARKET

1. Introduction

Asset allocation can involve, in addition to traditional assets such as bonds or shares, a broad spectrum of alternative investments. They include both investments in capital assets (e.g. hedge funds, private equity), consumable or transformable assets that can be used as economic inputs into production processes (e.g. grains, metals, energy products) and assets that store value (e.g. art, precious metals). They play an increasingly important role in portfolios of individual and institutional investors. According to the McKinsey report¹, three groups of alternative assets (i.e. hedge funds, private equity and real estate) have grown twice as fast as non-alternatives in the time period 2005–2013.

A specific subset of alternative assets are emotional assets which price is formed to a large extent under the influence of emotional factors, unique to each investor. Wine, which is similar to works of art, rare stamps or historical coins can be classified in this asset group. The common feature of these assets is the emotional premium which the investor is willing to pay to capture the emotional dividends expected to arise from the ownership of a particular asset.

The main goal of the paper is to identify the differences in price behaviour between traditional financial assets (stocks) and alternative investment assets (fine wines). The bubbles formation is selected as a price behaviour feature to be investigated.

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¹ *The trillion-dollar convergence: Capturing the next wave of growth in alternative investments*, Report of McKinsey&Co., August 2014, www.mckinsey.com, downloaded on 19.03.2015, p. 7.

2. Fine wine investment market

Vine cultivation and winemaking has a long tradition dating back to the ancient times². Over the centuries, the dominant position in viticulture and wine production was wielded by European countries such as France, Italy or Spain. This historical background is relevant here, as it explains the long-time experience and technological progress in winemaking processes in this Old World regions, and thus the scale of wine production and its quality. The growing activity of wine makers from the New World countries (e.g. USA, Australia, Chile) has made it necessary and reasonable to determine an assemblage of quality-driven wineries and distinguish wines of superior quality – fine wines.

Various factors affect the wine quality, and its assessment is substantially subjective. To classify particular wine vintage into the fine wine category several requirements need to be fulfilled: 1) existence of strong secondary market value, 2) ability to improve in the bottle, 3) strong track record, and 4) critical acclaim³. On the secondary fine wine market, various intermediaries (merchants, negotiants, wine dealers, etc.) are active, matching supply and demand for fine wines and transferring products obtained directly from recognised wineries (chateaux) to specific groups of customers, including on-trade, specialist retailers, investment funds or collectors. Increasingly important role in transaction execution and settlement is played by specialised wine exchanges (e.g. Liv-ex) operating as specialised marketplaces (mostly as electronic trading platforms) providing price transparency, market liquidity and dealing costs reduction (see Czupryna and Oleksy⁴). To ensure and maintain their superior flavour attributes, fine wines – that mature over time – must be subject to advanced storage processes. Both before and after bottling, these wines are stored in immaculate conditions, typically in cellars with stable temperature or air-conditioned warehouses. Special requirements during transportation need also to be met. The functioning of the fine wine market would be impeded, if not impossible, in the absence of a rating system implemented for assuring the objective assessment of product quality and acceptable by all market participants. In practice, several wine grading systems, developed and operated by independent and worldwide reputable

² K. Kris Hirst, *Wine and its origins: The archaeology and history of wine making. When and where was wine Invented?*, <http://archaeology.about.com>, downloaded on 19.03.2015.

³ J. Miles, *Investing in fine wine*, presentation given at the Family Alternative Investment Conference in London at 10–03–2011, www.liv-ex.com, downloaded on 19.03.2015.

⁴ M. Czupryna, P. Oleksy, *Development potential of commodity exchanges in CEE region: case study of the Polish wine market*, Proceedings of the 16th International Scientific Conference *Finance and Risk* 2014, Vol. 1, Publishing House Ekonóm, Bratislava 2014, pp. 54–63.

wine critics are applicable. The most famous ones include Robert Parker, James Suckling, Jancis Robinson, Jean-Marc Quarin, Jeff Leve, Stephen Tanzer or experts from Decanter Panel. For example, Parker's rating system employs a 50–100 point quality scale. In general, fine wines belong to the top rated wines and are judged as outstanding (90–95 points) or extraordinary (96–100 points).

Geography-wise, the major vineyards producing fine wines are situated in France, mainly in Bordeaux region and Burgundy. The confirmation of this fact can be seen in the annual list of the most powerful brands traded in the fine wine exchange Liv-ex (see Table 1). It should be mentioned here that due to changes in collectors' preferences and quality revolution in other places in last years, the market share of Bordeaux wines has been declining systematically.

Table 1. Percentage of trade on Liv-ex (regions, by value)

Region	2010	2011	2012	2013	2014 (YTD)
Bordeaux	95.2	93.2	87.2	82.1	79.2
Burgundy	1.2	2.6	5.5	7.0	6.2
Champagne	1.4	1.1	2.3	2.3	2.8
Rhône	0.7	1.2	1.5	2.8	4.0
Italy	0.9	1.5	2.3	3.5	5.7
Others (incl. USA, Australia, Spain, Chile, Argentina)	0.5	0.5	1.3	2.3	2.2

Source: *The 2014 Liv-ex Power 100*, p. 31, www.liv-ex.com, downloaded on 22 March 2015.

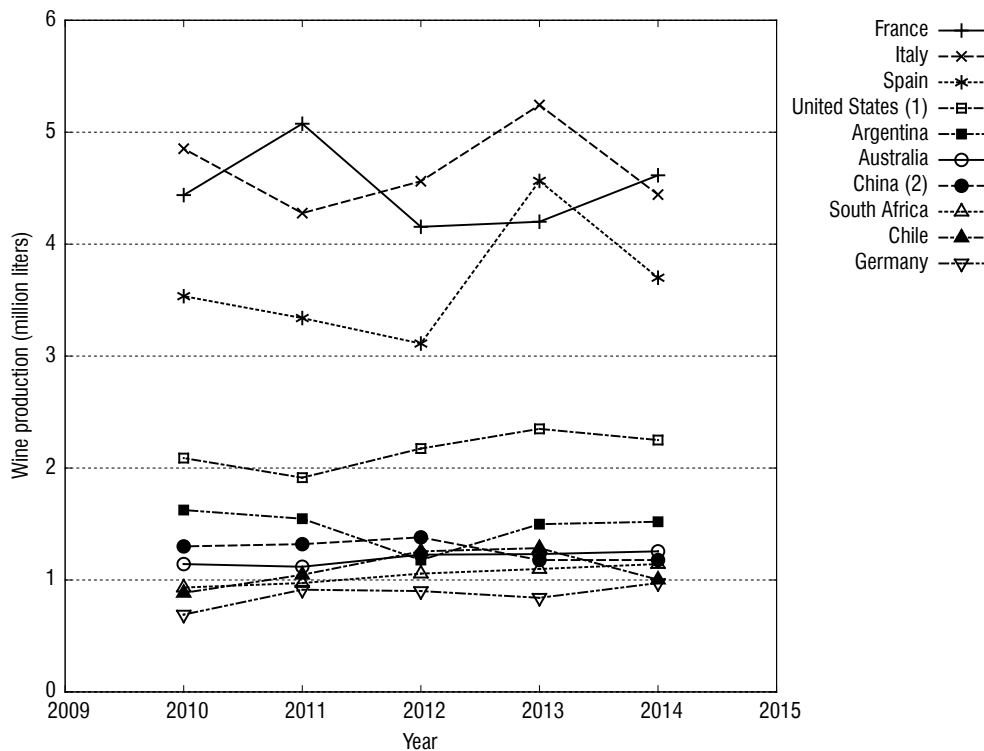
The wine supply in the major fine wine producing countries has been relatively stable over last years (see figure 1). Nevertheless, due to administrative constraints and restrictive assessment procedures, only a tiny fraction of total wine production (less than 1%⁵) can be considered investment grade.

Fine wine is a tangible asset which may be qualified as a Veblen good. Price formation is driven by several distinctive demand forces, such as global economic conditions, new markets (e.g. China, Hong-Kong), vintage quality, critical opinion and brand⁶. Dynamic development of fine wine exchanges and worldwide accessible trading platforms has stepped up interest and activity of numerous investors, including speculators, contributing to improve market efficiency, but on the other hand, causing simultaneously an evident increase in investment risk.

⁵ *The case for investment grade wine as a strategic alternative asset class*, www.trelliswineinvestments.com, downloaded on 22.03.2015.

⁶ J. Miles, op.cit.

Figure 1. Wine production (excluding juice and musts) in top 10 producing countries



where:

(1): The International Organisation of Vine and Wine (OIV) estimate (USDA basis).

(2): Report for 2013, 2014 figures not yet available.

Source: *Global Economic Vitiviculture Data: 271 mhl of wine produced in 2014*, International Organisation of Vine and Wine, Press Release, 23 October 2014.

From this vantage point, a fine wine, as a non-reproducible and exhaustible commodity with strong emotional charge, seems to be vulnerable to exaggerated upward price movements which can lead to the emergence of speculative bubbles. In traditional meaning, such bubbles occur when asset prices strongly deviate from their intrinsic value over a specific time horizon. Persistent price appreciation followed by market collapse can be influenced by both rational and irrational factors (group-think, herd **behaviour** etc.). Formally, applying a simple generalised model, rational speculative bubble (B_t) can be estimated as:

$$B_t = p_t - p_t^f + \varepsilon_t \quad (1)$$

where p_t is the asset market price, p_t^f is the fundamental price of an asset, ε_t is an exogenous stochastic value.

In practice, several approaches of detecting speculative bubbles have been developed. Generally, they intend to identify explosive effects in asset price trends basing on co-movements and cointegration relationships between analysed time series or price deviations from a random walk.

3. Review of literature

Price behaviour analysis for the presence of speculative bubbles has been for decades a subject of intensive research. Parallel to the typical historical studies on financial crises (e.g. Kindleberger⁷), explaining the reasons and consequences of bubbles that emerged in financial, commodity or real estate markets across the globe, numerous scientific investigations using advanced econometrical modelling have been conducted to detect and measure extreme upward trends in asset prices. Among analytical tools used to detect bubbles a dominant role have: cointegration approach (e.g. Diba and Grossman⁸), regime switching models (e.g. van Norden⁹) or recursive tests (e.g. Phillips, Wu and Yu¹⁰).

The mainstream of research refers to traditional stock markets. Most in-depth analysis explain explosive changes in security prices on the basis of their divergence from fundamental values based on expected dividend flows (e.g. Brooks and Katsaris;¹¹ Pierdzioch and Kizys¹²) or investors' expectations to receive positive abnormal returns (defined as bubble premiums) during a lifetime of rational speculative bubbles (Hardouvelis¹³).

⁷ C.P. Kindleberger, *Manias, panics, and crashes: a history of financial crashes*, 4th ed. Wiley, New York 2000.

⁸ B.T. Diba, H.L. Grossman, *Explosive rational bubbles in stock prices?*, "American Economic Review" 1988, Vol. 78, No. 3, p. 520.

⁹ S. van Norden, *Regime-switching as a test for exchange rate bubbles*, "Journal of Applied Econometrics" 1996, 11(3), pp. 219–251.

¹⁰ P. Phillips, Y. Wu, J. Yu, *Dating the timeline of financial bubbles during the subprime crisis*, Research Collection School Of Economics, Singapore Management University, Singapore 2011.

¹¹ C. Brooks, A. Katsaris, *Rational speculative bubbles: an empirical investigation of the London Stock Exchange*, "Bulletin of Economic Research" 2003, Vol. 55 No. 4, pp. 319–346.

¹² C. Pierdzioch, R. Kizys, *On the linkages of the stock markets of the NAFTA countries: fundamentals or speculative bubbles?*, "International Economic Journal" 2013, Vol. 27, No. 3, pp. 415–440.

¹³ G.A. Hardouvelis, *Evidence on stock market speculative bubbles: Japan, the United States and Great Britain*, "Federal Reserve Bank of New York Quarterly Review" 1988, pp. 4–16.

Periods of excessive exuberance may appear also in commodity markets. Because of their significant role in the real economy, the explanation of exorbitant price levels in various market segments seems to be especially important. Due to the considerable diversity within this asset class, price formation processes also differ among particular assets. As for now, the presence of rational speculative bubbles has not been conclusively confirmed. Depending on the method used and the range of analysed time series, some bubble episodes have been detected for example in wheat, corn and rough rice markets (Gutierrez¹⁴), also by West Texas Intermediate (WTI) crude oil, coffee, corn, soya bean no. 2, soya bean meal and oil, wheat no. 2 soft red and hard winter wheat, lean hogs, gold and platinum (Emekter, Jirasakuldech and Went¹⁵) and wheat (Etienne, Irwin and Garcia¹⁶). The results of research conducted by Etienne et al. further corroborate that **bubble** occurrences in selected commodity markets have represented a very slight portion (1.5% – 2%) of price behaviour during the 42-year period (Etienne, Irwin and Garcia¹⁷).

There is a scarcity of research evidence on price movements in fine wine investments markets, particularly in relation to rational speculative bubbles. The market is highly fragmented, therefore data collection is substantially limited. Taking into account that fine wine belongs to the consumable non-renewable goods, models based on Hotelling's equilibrium are useful in bubble detection in this market (Jovanovic¹⁸).

4. Methodology and data

As previously mentioned, there are many approaches to quantitative assessment of price bubbles. We have followed the approach proposed first by Phillips and Yu¹⁹ and Phillips, Wu and Yu²⁰. This approach has been modified (by allowing for bootstrap critical values calculation instead of theoretical ones in the original papers) and

¹⁴ L. Gutierrez, *Speculative bubbles in the agricultural commodity markets*, "European Review of Agriculture Economics" 2013, Vol. 40, pp. 217–238.

¹⁵ R. Emekter, B. Jirasakuldech, P. Went, *Rational speculative bubbles and commodities markets: application of duration dependence test?*, "Applied Financial Economics" 2012, Vol. 22, No. 7–9, pp. 581–596.

¹⁶ X.L. Etienne, S.H. Irwin, P. Garcia, *Bubbles in food commodity markets: Four decades of evidence*, "Journal of International Money & Finance" 2014, Vol. 42, pp. 129–155.

¹⁷ Ibidem.

¹⁸ B. Jovanovic, *Bubbles in prices of exhaustible resources*, "International Economic Review" 2013, Vol. 54, No. 1, pp. 1–34.

¹⁹ P. Phillips, J. Wu, J. Yu, *Explosive behavior in the 1990s Nasdaq: when did exuberance escalate asset values?*, "International Economic Review" 2011, Vol. 52, No. 1.

²⁰ P. Phillips, J. Yu, *Dating the timeline...*, op.cit.

applied to the commodity by Gutierrez²¹. This approach enable us not only to verify if the bubbles existed in the selected time period but also to identify the bubbles period start and end dates. An alternative approach of coexplosivity can be found in Nielsen²². The basic idea of the Phillips and Wu method is to estimate the series of regressions recursively in the autoregression specification:

$$X_t = \mu + \delta X_{t-1} + \varepsilon_t, \varepsilon_t \sim iid(0, \sigma^2) \quad (2)$$

The first regression occurs for $\tau_0 = [r_0 n]$ observations, the subsequent occurs for the size $\tau = [rn]$ for $r_0 \leq r \leq 1$. The parameter r can be interpreted as a fraction of the time series, starting from the first observation being taken into consideration. The subsequent regressions are based on the longer period of time.

In this paper we test the null hypothesis:

$$H_0 : \delta = 1$$

against the alternative:

$$H_1 : \delta > 1$$

The appropriate statistic DF_r^t is defined as:

$$DF_r^t = \left(\frac{\sum_{j=1}^{\tau} \bar{X}_{j-1}^2}{\hat{\sigma}_{\tau}^2} \right)^{\frac{1}{2}} (\hat{\delta}_{\tau} - 1) \quad (3)$$

where \bar{X}_j is the demeaned value of the original X time series. The statistic has the limiting distribution of:

$$DF_r^t = \frac{\int_0^{\tau} \bar{W}_r(s) dW(s)}{\left(\int_0^{\tau} \bar{W}_r^2(s) ds \right)^{1/2}} \quad (4)$$

where $W(s)$ denotes the standard Brownian motion and $\bar{W}(s)$ its demeaned version.

We can calculate the maximum value of DF_r^t statistics for different r values (we interpret r as a share of the sample taken into consideration in the linear regression). Critical values of $\max DF_r^t$ can be obtained in the Monte-Carlo simulations.

²¹ L. Gutierrez, *Speculative bubbles...*, op.cit.

²² B. Nielsen, *Analysis of coexplosive processes*, "Econometric Theory" 2010, No. 26, pp. 882–915.

Our results with exact number of observations in the sample were very close to the values presented by Phillips and Wu so that we finally decided to use their values.

Table 2. Critical values

Sample size	Test statistics	10%	5%	1%
500	DF_r^t	1.180	1.4603	2.0043
100	DF_r^t	1.914	1.5073	2.1899

Source: P. Phillips, J. Yu, *Dating the timeline of financial bubbles during the subprime crisis*, Research Collection School Of Economics, Singapore Management University, Singapore 2011.

Bubbles start (\hat{r}_e) and end (\hat{r}_f) identification is based on the following recursive rule:

$$\hat{r}_e = \inf_{s \geq \tau_0} \{s : DF_r^t > cv\} \quad (5)$$

$$\hat{r}_f = \inf_{s \geq \hat{r}_e + \gamma \ln(n)/n} \{s : DF_r^t < cv\} \quad (6)$$

where we have applied similar critical values (in two versions) as in the original and the following article:

$$cv = \log(\log(nr)) \quad (7)$$

$$cv = -0,08 + \log(nr) \quad (8)$$

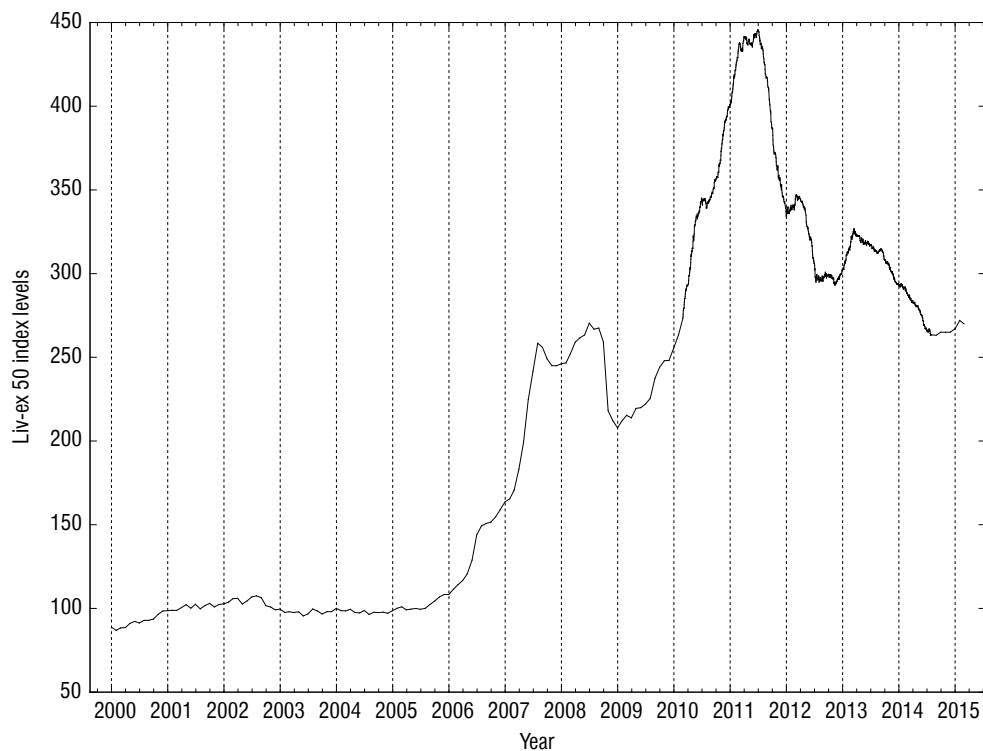
The primary source of the data is the Liv-ex 50 index. As disclosed by Liv-ex fine wine exchange, this index consist of 50 component wines – the last ten “physical” vintages of the five Bordeaux First Growths: Haut Brion, Lafite Rothschild, Latour, Margaux and Mouton Rothschild. Components are added in July, the year they become physical (2011’s added in July 2014), and removed after ten years (2001’s removed in July 2014). Each component is represented by one 12x75cl case, so that the weight of the each particular (based on vintage and Chateau) wine is equal (see www.liv-ex.com).

The time series starts on 31 December 1999, however up to 1 March 2010 only monthly data is available. We have finally used the time series starting from 1 December 2001 to 28 February 2015 and used only month-end data for the whole period of time.

We have also used the time series of the stock exchange indices of the countries where most of the Liv-ex customers live namely: FTSE (UK), CAC40 (France), HSI

(Hong Kong), DJIA (USA), DAX (Germany), SCH (China). We have also added WIG index (Poland) to the sample. We have taken the same period of time and only month end close price data for the stock exchange indices.

Figure 2. Liv-ex 50 index levels



Source: Liv-ex Ltd.

Results

For the r values we started from 20% of the whole sample and then increased gradually the value of the sample share by 1%, until we used the whole sample in the last regression.

The values of the tests together with critical values and significance levels (of 1%, 5% and respectively 10%) are presented in the Table 3.

As we can see there were bubbles in the Liv-ex 50 Index and only in selected stock exchange indices.

Table 3. Values of the tests

index	test.stat	c.value.1	c.value.5	c.value.10	pval.1	pval.5	pval.10
Liv-ex 50	9.849286	2.1899	1.5073	1.1914	TRUE	TRUE	TRUE
CAC40	0.601294	2.1899	1.5073	1.1914	FALSE	FALSE	FALSE
DAX	1.234881	2.1899	1.5073	1.1914	FALSE	FALSE	TRUE
DJI	0.569355	2.1899	1.5073	1.1914	FALSE	FALSE	FALSE
FTM	1.92977	2.1899	1.5073	1.1914	FALSE	TRUE	TRUE
HSI	5.020423	2.1899	1.5073	1.1914	TRUE	TRUE	TRUE
SCH	5.935695	2.1899	1.5073	1.1914	TRUE	TRUE	TRUE
WIG	2.377248	2.1899	1.5073	1.1914	TRUE	TRUE	TRUE

Source: Own calculations with R.

We have also identified (using two different subsets of the critical values) the start and end dates of the bubbles periods for each time series separately. The results are showcased in the tables 4 and 5.

Table 4. Bubbles start and end dates – subset 1

index	Start1	End1	Start2	End2	Start3	End3
Liv-ex50	2006.02.28	2008.08.31	2010.03.31	2011.08.31		
CAC40						
DAX						
DJI						
FTM	2006.02.28	2006.03.31	2006.10.31	2006.11.30	2007.03.30	2007.04.30
HSI	2007.06.29	2007.11.30				
SHC	2006.11.30	2007.11.30				
WIG	2006.02.28	2006.03.31	2006.10.31	2006.11.30	2007.03.30	2007.06.29

Source: Own calculations with R.

Table 5. Bubbles start and end dates – subset 2

index	Start1	End1	Start2	End2	Start3	End3
Liv-ex50	2006.02.28	2008.08.31	2010.03.31	2011.08.31		
CAC40						
DAX	2007.03.30	2007.04.30	2007.09.28	2007.11.30	2015.02.27	
DJI						
FTM	2005.11.30	2007.09.28				
HSI	2006.10.31	2007.11.30				
SHC	2006.11.30	2007.11.30				
WIG	2005.08.31	2005.08.31	2005.11.30	2006.03.31	2006.10.31	2007.09.28

Source: Own calculations with R

In the first period 2006–2007 we can observe that there is a bubble both in fine wine exchange and the majority of selected stock exchanges. We could not observe any succession relation among the fine wine market and stock exchanges. The second bubble, i.e. 2010–2011, can only be observed in the fine wine market.

6. Conclusions

Our research focuses on detection of rational speculative bubbles in the fine wine investment market. To verify their existence, recursive tests have been applied. Such approach has additionally allowed to determine time frames (start and end dates) of potential bubbles.

The results show that speculative bubble episodes appeared between 2006–2007 both in fine wine market and in most of selected traditional stock exchanges, in some cases even several times. It should not be surprising taking into account the occurrence of global financial crisis in the end of this time period. However, what is **remarkable is that only the fine wine market recorded the second wave of speculative bubbles between 2010–2011. One of the reason of this fact may be that numerous investors** perceived this segment as a safe (or rather safer) haven for their funds or savings at that time and were attracted to invest there. Stabilisation on traditional stock exchanges and economic recovery initiated rebalancing process of their portfolios and sell-out of fine-wines what might have contributed to deeper price correction. Other reasons may be attributed to changes in demand driven by fine wine collectors and buyers from emerging markets (e.g. from China).

To make our analysis on price behaviour in the fine wine market more comprehensive our further research will focus on testing for rational speculative bubbles in a coexplosive vector autoregression.

7. Acknowledgments

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References:

- Brooks C., Katsaris A., *Rational speculative bubbles: an empirical investigation of the London Stock Exchange*, "Bulletin of Economic Research" 2003, Vol. 55, No. 4.
- Czupryna M., Oleksy P., *Development potential of commodity exchanges in CEE region: case study of the polish wine market*, Proceedings of the 16th International Scientific Conference *Finance and Risk 2014*, Vol. 1, Publishing House Ekonóm, Bratislava 2014.
- Diba B.T., Grossman H. L., *Explosive rational bubbles in stock prices?*, "American Economic Review" 1988, Vol. 78, No. 3.
- Emekter R., Jirasakuldech B., Went P., *Rational speculative bubbles and commodities markets: application of duration dependence test?*, "Applied Financial Economics" 2012, Vol. 22, No. 7–9.
- Etienne, X.L., Irwin S.H., Garcia P., *Bubbles in food commodity markets: Four decades of evidence*, "Journal of International Money & Finance" 2014, Vol. 42.
- Gutierrez L., *Speculative bubbles in the agricultural commodity markets*, "European Review of Agriculture Economics" 2013, Vol. 40.
- Hardouvelis, G.A., *Evidence on stock market speculative bubbles: Japan, the United States and Great Britain*, "Federal Reserve Bank of New York Quarterly Review" 1988.
- Hirst K.K., *Wine and its origins – the archaeology and history of wine making. When and where was wine invented?*, <http://archaeology.about.com>, downloaded on 19.03.2015
- Jovanovic B., *Bubbles in prices of exhaustible resources*, "International Economic Review" 2013, Vol. 54, No. 1.
- Kindleberger C.P., *Manias, panics, and crashes: a history of financial crashes*, 4th ed. Wiley, New York 2000.
- Miles J., *Investing in fine wine*, presentation given at the Family Alternative Investment Conference in London on 10.03.2011, www.liv-ex.com, downloaded on 19.03.2015.
- Nielsen B., *Analysis of coexplosive processes*, "Econometric Theory" 2010, Vol. 26.
- Phillips P., Wu Y., Yu J., *Explosive behavior in the 1990s Nasdaq: when did exuberance escalate asset values?*, "International Economic Review" 2011, Vol. 52, No. 1.
- Phillips P., Yu J., *Dating the timeline of financial bubbles during the subprime crisis*, Research Collection School Of Economics, Singapore Management University, Singapore 2011.
- Pierdzioch C., Kizys R., *On the linkages of the stock markets of the NAFTA countries: fundamentals or speculative bubbles?*, "International Economic Journal" 2013, Vol. 27, No. 3.
- The trillion-dollar convergence: Capturing the next wave of growth in alternative investments*, Report of McKinsey&Co., August 2014, www.mckinsey.com, downloaded on 19.03.2015.
- Van Norden S., *Regime-switching as a test for exchange rate bubbles*, "Journal of Applied Econometrics" 1996, No. 11(3).

Rational Speculative Bubbles in the Fine Wine Investment Market

The paper focuses on detection of rational speculative bubbles in fine wine investment market. Our research was conducted using recursive tests. The chosen method additionally allowed us to set time frames for potential bubbles. The results have shown that speculative bubble episodes appeared between 2006–2007 both in fine wine market and in most of selected traditional stock exchanges. However, only the fine wine market recorded the second wave of speculative bubbles between 2010–2011.

Keywords: rational speculative bubbles, fine wine, wine investment, wine exchange

Les bulles spéculatives rationnelles sur le marché de l'investissement dans les vins raffinés

Le document met l'accent sur l'analyse des bulles spéculatives rationnelles sur le marché de l'investissement dans les vins raffinés. La recherche a été basée sur des tests récursifs. La méthode choisie a permis d'identifier des périodes des bulles potentielles. Les résultats montrent que les épisodes des bulles spéculatives ont été observées entre 2006 et 2007, à la fois pour le marché des vins raffinés et pour la plupart des bourses traditionnelles sélectionnées. Toutefois, seul le marché des vins a enregistré la deuxième vague des bulles spéculatives entre 2010 et 2011.

Mots clés: les bulles spéculatives rationnelles, les vins raffinés, l'investissement dans le vin, l'échange de vin

Рациональные спекулятивные пузыри на рынке вин инвестиционного качества

Цель статьи состоит в обнаружении рациональных спекулятивных пузырей на рынке вин инвестиционного качества. Исследование проводилось с использованием рекурсивных тестов. Кроме того, этот метод позволил определить временной диапазон потенциальных спекулятивных пузырей. Согласно результатам исследования пузыри появились в 2006–2007 гг. как на рынке вина инвестиционного качества, так и на большинстве подобранных

традиционных фондовых бирж. Тем не менее, в 2010–2011 гг. на рынке вин была отмечена вторая волна спекулятивных пузырей. Вторая волна спекулятивных пузырей появилась только на винном рынке.

Ключевые слова: рациональные спекулятивные пузыри, вина инвестиционного качества, инвестиции в вино, винная биржа