

Strategies and Intepreting Models of a Reformed DOC: the Prosecco Case Study

Luca Rossetto¹, Vasco Boatto², Luigino Barisan³
University of Padova.

(June 2010, Final Version: December 2010)

Abstract

Recently, Prosecco wine industry has dramatically increased. Wine producers were able to exploit successfully opportunities coming from both the supply growth and consumer appreciation (Boatto *et al.*, 2008; Boatto *et al.*, 2009). More recently, this success has been accomplished by an increasing competition on both domestic and international markets. In July 2009, the geographical denomination Prosecco (DO) has been strongly reformed: i) the Prosecco area has been unambiguously defined by introducing a new DOC (controlled DO) while the previous one has been replaced by the DOCG (controlled and guaranteed DO); ii) the name Prosecco has also been restricted to wine coming from that area only. This reform is supposed to further protect the value of Prosecco brand; however, dangerous threats have arisen since the Prosecco area have been significantly extended and the management of DOs is not yet clear. Theoretically, the theory of Clubs may give some hints in managing DOCG while the enforcement through a central authority may be the exit strategy for the management of new DOC. In this paper both hypothesis have been investigated. Results of NCP analysis confirm the significance of the Club for DOCG producers while forecasts about the increasing supply production and effects on prices are consistent with the tragedy of commons scenario. Eventually, the change in DOs should be accomplished by actions safeguarding the value of Prosecco as collective brand.

JEL classification: Q13, C18.

Keywords: Prosecco, Denomination of Origin, Non Parametric Model, Club Goods, Tragedy of Commons.

¹Full Professor in Wine Economics and Policy, Research Center for Viticulture and Oenology (Cirve), University of Padova - Viale XXVIII Aprile, 14 - 31015 Conegliano (Treviso).

²Research Center for Viticulture and Oenology (Cirve), University of Padova.

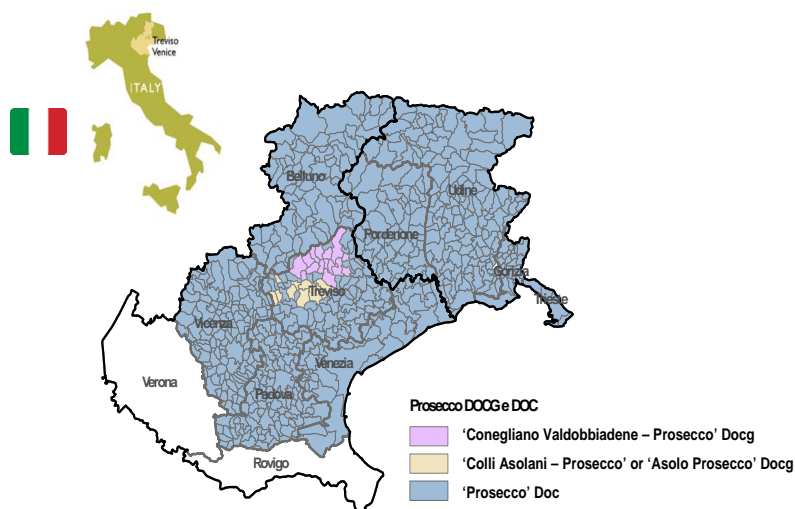
³Corresponding author: luigino.barisan@unipd.it, Center for Viticulture and Oenology (Cirve), University of Padova. The authors accept sole responsibility for any errors.

1 Introduction

Right after the reform of the Denomination of Origin of Prosecco, an important issue did arise regarding the managing of the newborn DOCG and DOC. If on the one side this intervention was aiming at defending the producers from an unfair competition made by the operators of lands far away from the typical ones of the Prosecco production, both in Europe and in the countries of the ‘New World’, on the other side the legal-administrative activity – opens new scenarios and bring about new questions on the correct managing of the Denomination (Figure 1).

In this article you will find the results of a survey made on the companies working in the Prosecco field with the purpose to obtain a first evaluation on the effects of this reform and more precisely on those regarding the stability of the market as well as on the image and reputation of Prosecco.

Figure 1: Areas of Prosecco DOCG and DOC after the reform

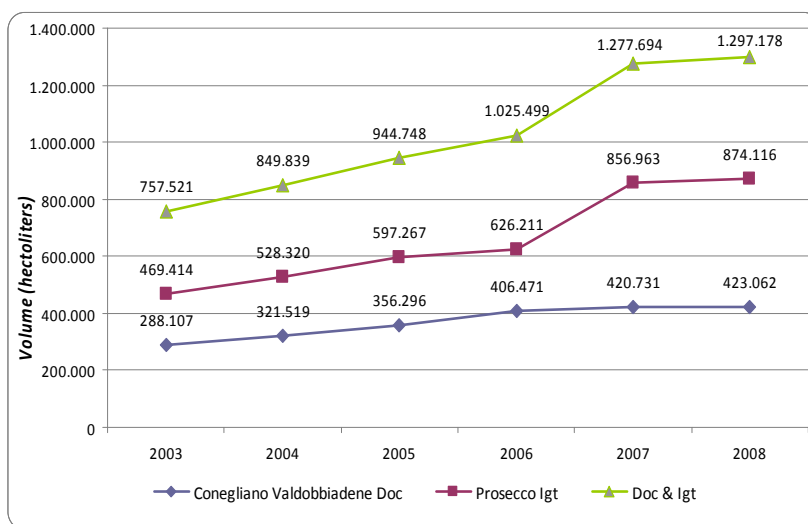


Before proceeding with the results, it seems appropriate to provide some useful information to understand the key factors of the Prosecco field and Denomination (Figure 2) (Boatto *et al.* 2009a; Boatto *et al.* 2009b). The DOC Prosecco, managed by the Conegliano Valdobbiadene Protection Consortium since 1969, before the reform was already stretching over 4.908 hectares while main sparkling bottling companies are about 170 with 5,000 employees. The production of DOC Prosecco is about 57 million bottles, of which 48 million are sparkling Prosecco (82% of total). There is also a niche production of a high quality Prosecco, called Cartizze, namely “Superiore di Cartizze”, which involves 109 hectares and 1.3

millions of bottles. The line of Prosecco production includes also 7.5 millions of semi - sparkling wine and half million bottles of still wine (Boatto *et al.* 2009a; Boatto *et al.* 2009b). Almost 30% of Prosecco wine production is exported; most of foreign sales are sparkling Prosecco. The total value produced by Prosecco at consumption level is around 370 million euro corresponding to an average value of 6.5 euro per bottle. Over the last five years the DOC production has shifted from 39.5 to 57.3 million bottles, i.e., it has increased at the rate of 9% per year.

The Prosecco IGT was, instead occupying a surface of about 7.400 hectares, mainly within the Province of Treviso and a production of 116 million bottles, 55% of which, destined to foreign markets (Boatto *et al.* 2009b). In the last three years, the IGT supply has been increased at an average rate around 16 - 18%. Both Denominations of Origins (DOs) had successfully driven the Prosecco production and its supply.

Figure 2: Evolution of the Prosecco DOC & IGT production, years 2003 –2008



According to the research studies made by the Economics Observatory of the Prosecco District⁴, the field is controlled by medium-large companies producing both Prosecco DOC and IGT and offering a wide range of wines in relation with a multiple – channel and multiple –prices strategy followed in the domestic and international market. There are also many small size companies that follow diversified strategies, focused towards quality and/or price also in relation to characteristics

⁴Starting from 2003, the CIRVE, supported by the Prosecco Consortium, collects data from a meaningful range of companies, takes care of the data processing and finally provides an annual report.

and production volumes. Generally, one of the key factors for the success of this wine is the good quality/price ratio, besides the high range of products that meet with the expectations of a growing number of consumers.

Success has brought the interest of many local and international producers together with the development of aggressive marketing aimed at increasing sales but with little attention paid to quality. The competition comes not only from Italian producers, located outside the Prosecco area, but also from foreign companies both in Europe (e.g. Romania and Spain) and out of Europe (Brazil, Argentina). According to the theory of contestable markets (Baumol *et al.* 1982), rivals have dramatically increased because of high profits and low barriers to entry.

The growing competition and the reform of CMO⁵ for vine/wine are the main motivations that have led to the modifications of the Denomination arrangement. This situation has encouraged local producers to work out effective strategies for protecting their territory and the quality of Prosecco. Eventually, the Ministry of Agriculture accepted Prosecco producers requests through a regulation which established the Prosecco DOCG instead of old DOC and introducing a new DOC Prosecco over a wide area covering many provinces both in Veneto and Friuli Venezia Giulia Regions. This reform has been strongly supported by the Consortium and its members because the DOCG is supposed to give a strong protection to local producers⁶. The conversion from IGT to DOC is mainly driven by the need to define clearly and unambiguously the production area avoiding any misunderstandings or spreads between grape production area and the place where wine processing is done. The DOs reform has deleted the Prosecco variety from the national register substituting it with the Glera variety while the name Prosecco cannot be used for wines produced outside DOCG or DOC areas.

This arrangement seems to open new opportunities for producers as well as the challenging perspective that Prosecco might reach a leadership position at both domestic and international markets. Conversely, the introduction of this measure implies an appropriate governance of the overall area which design is still on debate, *i.e.*, the activity of governing should be studied carefully because it may have a strong impact on producer' profitability.

In this paper the process of changing Denomination of Origins have been investigated. In the following paragraph, a review of theoretical models is drawn to analyze different governance scenarios for Prosecco firms. The analysis of the effects of the reform have developed by taking into consideration two possible managing hypothesis on the new Denominations. As far as the historical production area one makes as hypothesis the adoption of a management model referring to the Club's theory. As far as the new area of DOC Prosecco production, a management model was applied which is able to avoid the risks of dimming the image

⁵Council Regulation (EC) No 479/2008 on the Common Organization of the Market in wine and the implementing Regulation (EC) No 702/2009.

⁶DOCG wines follow restrictive production rules while wines have to pass a tasting Commission examination.

and reputation of Prosecco. For this second hypothesis we refer to the managing of the common goods.

2 The Club theory applied to the case of companies in the DOCG 'Conegliano Valdobbiadene – Prosecco' District

The existence of a Prosecco *Club* is based on the fact that over the past twenty years and more, the historical firms have acquired the awareness on the importance to protect the value of Prosecco intended as brand or *terroir*. Said experience translated into a behaviour aimed at a self controlled production and at a free compliance with the production standard.

The way out we propose as strategy is based on the theoretical models developed by Hirschman and the theory of Clubs (Hirschman 1970; Buchanan 1965). Hirschman developed a theoretical model that distinguishes between relevant processes in which individuals express preferences with the decisions of entry (*entry*) or exit from a market (*exit*) and to make written or verbal claims (*voice*).

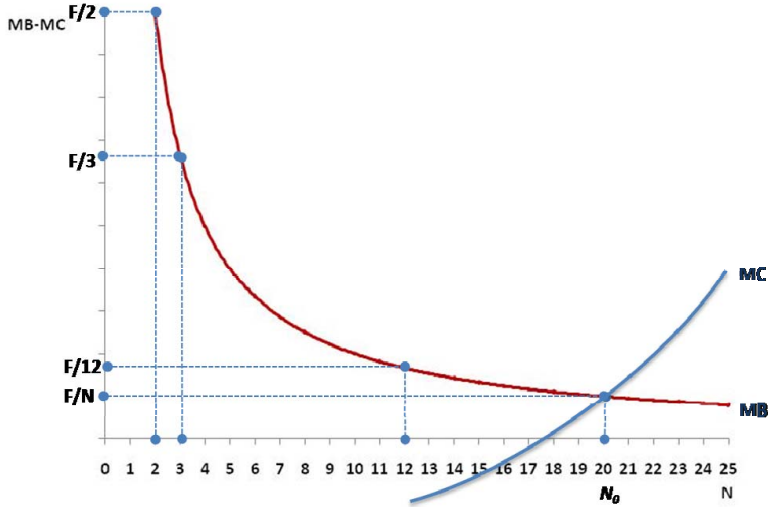
Two main effects can be shown according to number of Club members (Figure 3). The first effect is about the marginal benefit which decreases as members are added because of economies of scales (Buchanan 1965). For instance, in the Figure 3 the marginal benefit of the first member when a second one is added to the Club is 1/2 of the production cost (F), *i.e.*, the $MB=F/2$; similarly, the marginal benefit of 2 members when a third one is added is $F/3$, etc.. The second effect is the marginal cost (MC). MC is negative when the number of members is low but it increases as participants go up because of the congestion effect (*i.e.*swimming pool). Thus, the optimal size of a Club (members) implies an equilibrium between benefits and congestion costs. Another issue refers to the existence of more than one Club. In this case a member can migrate from a Club to another according to his/her convenience to shift to the new Club (Buchanan 1965).

Figure 3 – .

When Clubs are established, the theoretical model can draw a Pareto efficient solution by applying excludability and assuming a 'tacit' choice of producers joining the Club they prefer. However, it is not possible to reach an optimal Pareto outcome with many Clubs (Buchanan 1965; Berglas 1976). Among the advantages, this model allows to overcome the effects of non-cooperative scenarios, while reaching a second-best economic result for producers (second best), through co-operative scenarios, instead of better performance (first best) which cannot be achieved in the market because of unavoidable entry of competitors (Berglas 1976).

Hypothesis under the theory of Clubs may be useful in managing the Prosecco production. Since the name of Prosecco wine was linked to the vineyard, it could be considered as a 'local' good with a joint supply (DOC and IGT) and partial excludability ("quasi" public good) because of its limited production area. The management of the Club of Prosecco requires: i) an optimal allocation of costs

Figure 3: The size of the Club



Source: Buchanan, 1965.

among producers reflecting inequalities in the use of the Club (production technology, climate and soil conditions, etc.); ii) to enforce the excludability through institutional devices (i.e. restrictions on eligible area, past experience in producing Prosecco, etc.).

2.1 The empirical analysis

The analysis on Prosecco producers is aimed to figure out the impact of DO's reform. The study includes two analysis: i) the model structure-conduct-performance (SCP) is applied to a sample of producers to measure the evolution of Prosecco industry over time; ii) a forecast about the introduction of DO's reform is done using results coming from the previous analysis.

The DOC production area has been analyzed through a descriptive - analytical model following the structure-conduct-performance approach (SCP) (Stigler 1968; Sutton 1991, 1998; Carlton and Perloff 2005; Perloff *et al.* 2007). The SCP model is aimed to figured out the followings. i) the logical issues business organization; ii) information about strategies followed by producers. The main hypothesis is to test the SCP model on a panel of Prosecco firms over six years (2003 - 2008).

2.2 The SCP model: methodology

The analysis is done by applying a non-parametric multi-layer and multivariate technique called NonParametric Combination (NPC) (Pesarin 2001, 2002; Corain and Salmaso 2004). Starting from a one-way MANOVA layout, we can define the data structure as follows.

Denote by \mathbf{X} an $(n \times k)$ data set:

$$\mathbf{X} = [\mathbf{X}_1, \dots, \mathbf{X}_j, \dots, \mathbf{X}_c]' = [\mathbf{X}_1, \dots, \mathbf{X}_i, \dots, \mathbf{X}_k],$$

where \mathbf{X}_j , $j=1, \dots, C$, ($C \geq 2$) represents the j -th $n_j \geq k$ group, $n_j \geq 2$ and $\sum_j n_j = n$, and X_i is the i -th univariate aspect of \mathbf{X} , $i=1, \dots, k$ ($k \geq 1$); moreover let \mathbf{X}_{ji} represent the i -th univariate aspect of \mathbf{X}_j .

In the context of NPC of Dependent Permutation Tests a set of conditions should be jointly satisfied:

1) suppose that for $\mathbf{X} = [\mathbf{X}_1, \dots, \mathbf{X}_c]'$ an appropriate probabilistic k -dimensional distribution structure P exists, $P_j \in F$, $j=1, \dots, C$, belonging to a family F of non-degenerate probability distributions.

2) the null hypothesis H_0 states the equality in distribution of the multivariate distribution of the k variables in all C groups:

$$H_0 : [P_1 = \dots = P_C] = [X_1 \stackrel{d}{=} \dots \stackrel{d}{=} X_C]$$

Null hypothesis H_0 implies the exchangeability of the individual data vector with respect to the groups. Moreover H_0 is supposed to be properly decomposed into k sub-hypotheses H_{0i} , $i=1, \dots, k$, each appropriate for partial (univariate) aspects, thus H_0 (multivariate) is true if all the H_{0i} (univariate) are jointly true:

$$H_0 : \left[\bigcap_{i=1}^k X_{1i} \stackrel{d}{=} \dots \stackrel{d}{=} X_{C1} \right] = \left[\bigcap_{i=1}^k X_{0i} \right]$$

H_0 is called the global or overall null hypothesis, and H_{0i} , $i=1, \dots, k$, are called the partial null hypotheses.

3) The alternative hypothesis H_1 is represented by the union of partial H_{1i} sub-alternatives:

$$H_1 : \left[\bigcup_{i=1}^k H_{1i} \right]$$

so H_1 is true if at least one of sub-alternatives is true. In this context, H_1 is called the global or overall alternative, and H_{1i} , $i=1, \dots, k$, are called the partial alternatives.

4) let $\mathbf{T} = \mathbf{T}(\mathbf{X})$ represent a k -dimensional vector of test statistics, $k > 1$, whose components $T_i = T_i(X_i)$, $i=1, \dots, k$, represent the partial univariate and non-degenerate partial test appropriate for testing the sub-hypothesis H_{0i} against H_{1i} . Without loss of generality, all partial tests are assumed to be marginally unbiased, consis-

tent and significant for large values.

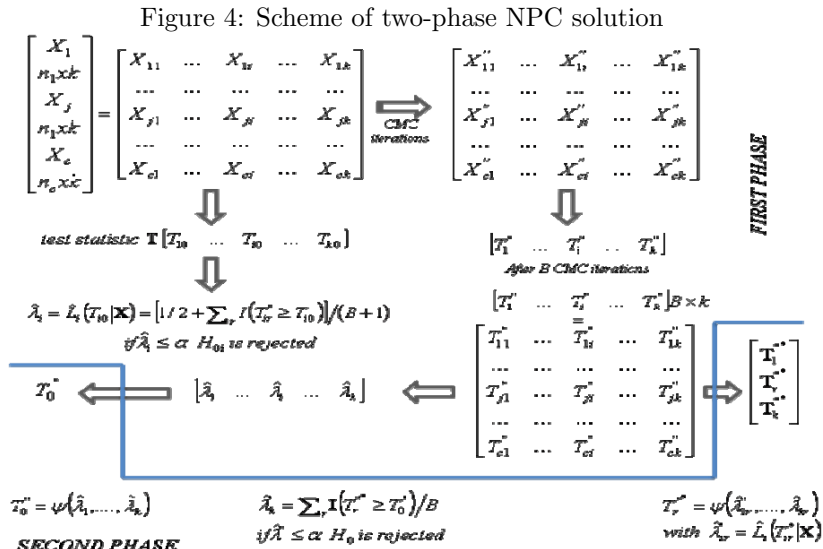
So far, in order to test the global null hypothesis H_0 , the key idea comes from the partial (univariate) tests which are focused on k partial aspects, and then, combining them in an function, from a global (multivariate) test. The latter is referred as the global null hypothesis. However, there is a computational problem. Actually, when the sample size is great, there are computational difficulties in calculating the conditional permutation space. In other words, it is not possible to calculate the exact p -value of observed statistic T_{i0} . This is overcome by using the CMCP (Conditional Monte Carlo Procedure). The CMCP is essentially a multivariate procedure (for more details see Corain and Salmaso 2004).

Once the hypothesis system is defined and an appropriate set of k statistics $T_i = T_i(X_i)$,

$i=1, \dots, k$ are computed, the test on the global null hypothesis consists of two phases:

1. performing k partial tests;
2. combining them in a second-order global test.

The complete framework of NPC solution is shown in figure 4.



Source: Corain and Salmaso, 2004.

Remember that, in order to preserve the underlying dependence relations among variables, permutations must always be carried out on individual data vectors, so that all component variables and partial tests must be jointly analyzed.

The first phase consists in the following steps:

i) Calculating the k -vector of observed values of test statistics \mathbf{T}_0 :

$$\mathbf{T}_0 = \mathbf{T}(\mathbf{X}) = [T_{i0}(X_i), i=1, \dots, k];$$

ii) Data permutation of \mathbf{X} by a random resampling \mathbf{X}_r^* , in order to randomly assign every individual data vector to a proper group and then calculate the vector statistics \mathbf{T}_r^* :

$$\mathbf{T}_r^* = \mathbf{T}_r^*(\mathbf{X}_r^*) = [T_{ir}^*(X_{ir}^*), i = 1, \dots, k] \quad ;$$

iii) carrying out B independent repetitions of step ii) the result is a set \mathbf{T}^* of $B \times k$ CMC

$$\mathbf{T}^* = [\mathbf{T}_r^*, r = 1, \dots, B] = [\mathbf{T}_1^*, \dots, \mathbf{T}_r^*, \dots, \mathbf{T}_B^*] \quad '$$

is thus a random sampling from the permutation k -variate distribution of vector test statistics \mathbf{T} ;

iv) the k -variate EDF (*Empirical Distribution Function*) $\hat{F}_B(\mathbf{z}|\mathbf{X})$

$$\hat{F}_B(\mathbf{z}|\mathbf{X}) = \left[\frac{1}{2} + \sum_r \mathbf{I}(\mathbf{T}_r^* \leq \mathbf{z}) \right] / (B + 1), \forall \mathbf{z} \in \mathfrak{R}^k$$

where $\mathbf{I}(\bullet)$ is the indicator function, and gives an estimate of the corresponding k -dimensional permutation distribution $F_B(\mathbf{z} | \mathbf{X})$ of \mathbf{T} . Moreover,

$$\hat{L}_i(z|\mathbf{X}) = \left[\frac{1}{2} + \sum_r \mathbf{I}(T_{ir}^* \geq z) \right] / (B + 1), i = 1, \dots, k,$$

gives an estimate $\forall z \in \mathfrak{R}^1$ of the marginal permutation significance level function.

$$L_i(z|\mathbf{X}) = \Pr \{T_i^* \geq z|\mathbf{X}\}$$

Thus

$$\hat{L}_i(T_{i0}|\mathbf{X}) = \hat{\lambda}_i$$

gives an estimate of the marginal p -value $\lambda_i = \Pr \{\mathbf{T}_i^* \geq \mathbf{T}_{i0}|\mathbf{X}\}$ relative to test \mathbf{T}_i , $i=1, \dots, k$. All these are unbiased and consistent estimates of corresponding true values.

v) if $\hat{\lambda}_i < \alpha$, the null hypothesis H_{0i} relating to the i -th variable is rejected at the significance level α .

The second phase, based on a nonparametric previous tests, consists in the following steps:

a) The combined observed value of the second-order test is evaluated through the same CMC results as the first phase, and it is given by:

$$\mathbf{T}''_0 = \psi(\hat{\lambda}_1, \dots, \hat{\lambda}_k);$$

b) The r -th combined value of vector statistics (step *iv*) is then calculated by

$$\mathbf{T}''^* = \psi(\hat{\lambda}_{1r}^*, \dots, \hat{\lambda}_{kr}^*),$$

where $\hat{\lambda}_{ir}^* = \hat{\mathbf{L}}_i(\mathbf{T}_{ir}^*|\mathbf{X})$, $i = 1, \dots, k$, $r = 1, \dots, B$

c) Hence, the p -value of combined test \mathbf{T}'' is estimated as:

$$\lambda''_{\psi} = \sum_r \mathbf{I}(T_r''^* \geq \mathbf{T}_0'') / B$$

d) If $\lambda''_{\psi} \leq \alpha$, the global null hypothesis H_0 is rejected at significant level α ; where ψ is an appropriate combining function.

In the nonparametric, combination procedure, several combination functions may be considered while having some features or properties (for more details see Corain and Salmaso 2004). The nested combination is a procedure where a intermediate combinations which reflect the meaningful classification rules

2.3 SCP model: data and results

To verify this hypothesis, the model structure -behaviour- performance was applied to a group of bottling companies in the area DOCG ‘Conegliano Valdobbiadene – Prosecco’⁷. The analysis was carried out on panel of 109 units, over six years (2003-2008)⁸ representing the 76% of total sparkling Prosecco companies and about 65 million bottles. The dataset includes 667 records for 237 variables⁹.

The stratification in business clusters has been drawn on the basis of the total number of bottles sold annually (standard = 0.75 liters) for both DOs. The dataset was divided into four clusters: Ti) small units (<150,000 bottles), ii) medium-sized ones (150,000-500,000), iii) \$large companies (500.001-1.000.000), iv) very large companies (> 1,000,000).

The drivers of the model are the business structure (S), the conduct on the market (C) (bottles sold), the performance as price (P). Partial tests are carried out on the business structure (S) as management and organization, vineyard and wine processing or cellar, on the market conduct (C) as Italian consumption (Nielsen areas), overall distribution, European markets, markets outside Europe, on the price performance (P) as price reported in direct and wholesale channels in Italy. The NPC analysis has been carried out through the *software NPC test-R10* which test the model over time and within each year according to the size of the units.

⁷Usually, bottling wine companies are located in DOC area but they produce a wide range of wines going from DOC to IGT or from sparkling to semi-sparkling Prosecco.

⁸Starting from 2003, a survey is carried out among Prosecco companies. The panel employed in NCP analysis has been actually extracted from the database consisting of about 160 units per year. Prosecco companies collected in the sample make wine processing and bottling; some of them have also the vineyard.

⁹Variables can be classified in the following categories: i) management and organization; ii) vineyard; iii) oenology; iii) marketing channels in Italy and foreign markets; iv) price positioning.

Results confirm that the SCP model is significant over time showing differences among business class size within each year and perceptible trends over time (Figure 2). Different strategies have been detected on group drivers such as management and organization, vineyard and wine processing (structure) which lead to different conducts on Italian market (Nielsen areas and marketing channels) on foreign markets (European and extra-European markets) while price performances seems to be related to business size. Results show a differentiated strategies as market conduct and price positioning. Likely, this outcome is associated with a change in the marketing mix on products and prices over time reported for overall units (from DOC, to Cartizze, to no-DOC) for Denomination of Origins (DOC and IGT) and for specific type of product (i.e. sparkling versus semi-sparkling DOC, etc.). For instance, there is a strong statistical significance (*p-value*) in comparing the conduct as number and type of marketing channels in Italy, as penetration of foreign markets (number of foreign countries importing Prosecco) or as importance of direct versus wholesale channels.

The analysis of results over time (2003-2008) allow us to draw patterns followed by Prosecco firms in the last years as well as the evolution strategies adopted by firms according to conditions of the wine market.

The results of this model were therefore used to verify the impact of the introduction of the reform. In this case we presumed conservatively that the companies would have behaved in a similar way also after the reform. Data were then adjusted with the introduction of additional information over investments on Prosecco grapevines in the past few years and estimates on the price elasticity compared to consumption. By assuming that the surface previously invested with DOC be then converted into DOCG, the forecast does not seem to tell a significant increase for this last Denomination.

In the light of these results it seems likely to assume the managing of the new DOCG like a *Club*. The advantages of the Club are many and range from reaching the optimum size that minimizes costs and avoids congestion to a better knowledge of the production area, up to easier controls of the investments and of productive processes besides the possibility to introduce a system of traceability, moreover to a marketing economy (advertising campaigns) or to a better management of the brand. In the DOCG the problems seem tied up with the convenience of said conversion as the most limiting constraints could be not compensated by reasonable selling prices.

In this case the Consortium has started a series of initiatives aimed at making differences (i.e. applying the wordings “Rive” to enhance the production from the hills which are difficult to cultivate) or to promote Prosecco DOCG.

The best *governance* of the DOCG, made through the *Club*, could bring about positive conclusions for the DOC, in terms of image and intangible value to convey through the media.

Table 1: P-value table for each tested hypotheses comparing 4 business class sizes, all Prosecco wines and from 2003 to 2008

Partial Test (<i>p</i> - Combined):	All years <i>C</i> -Samples	Comparison among groups within each year					
		2003	2004	2005	2006	2007	2008
Structure (S)							
<i>Management and organization</i>	0.0010**	0.0010**	0.0010**	0.0010**	0.0010**	0.0010**	0.0010**
<i>Vineyard</i>	0.0090**	0.9580	0.9600	0.0250*	0.0020**	0.0040**	0.1698
<i>Wine processing</i>	0.1489	0.0090**	0.0040**	0.0010**	0.0010**	0.0010**	0.0010**
Market conduct (C)							
<i>Italy and Nielsen areas</i>	0.4895	0.9321	0.9141	0.5774	0.0250*	0.9251	0.0110*
<i>Distribution in Italy</i>	0.0110*	1.0000	0.1678	0.0300*	0.0250*	0.0370*	0.0010**
<i>European markets</i>	0.0490*	1.0000	0.3247	0.2557	0.0020**	0.0060**	0.0010**
<i>World markets (no Europe)</i>	0.0350*	1.0000	0.3247	0.1638	0.0020**	0.0110*	0.0030**
Price Performance (C)							
<i>Direct channel in Italy</i>	0.0190*	0.1538	0.1409	0.0160*	0.0240*	0.3776	0.3766
<i>Wholesale channel in Italy</i>	0.3127	1.0000	1.0000	0.0020**	0.0140*	0.0529	0.0010**
Driver groups (SCP)							
<i>Structure of firms</i>	0.0070**	0.0010**	0.0010**	0.0010**	0.0010**	0.0010**	0.0010**
<i>Market conduct</i>	0.0330*	0.9810	0.3497	0.1139	0.0010**	0.0150*	0.0010**
<i>Price performance</i>	0.0440*	0.1538	0.1409	0.0040**	0.0130*	0.1069	0.0050**
Test overall SCP model							
<i>p</i> -GLOBAL	0.0150*	0.0150*	0.0020**	0.0010**	0.0010**	0.0020**	0.0010**

Statistical significance at 1% (**) and 5% (*).

3 The theory of the Common Goods applied to the companies of DOC 'Prosecco'

The question of the new DOC remains instead a problem. In this case rather than the production restraint (from 25 to 18 tons per hectare) we are worried by the risks arising from the access of new producers that have no experience and are not aware of the importance to protect the *brand* Prosecco. The success of this market could in fact favour strategic or uncontrolled policies that, by exploiting the image of this wine, could obtain easy profits. The consequence is a depreciation of the common brand and in the long run of the image of Prosecco. If we presume a conversion of the IGT to the DOC and the trend of new grape vine investments, the surfaces with Prosecco investments could rise from the actual 7.400 to about 12.000 hectares that would increase by 70% the wine production (Table 2 & 3) (Barisan 2010). As far as prices, the offer increase following a an elasticity increase of Prosecco consumption as registered in the past three years, could create a reduction of about 21% of the selling rate. This last value is in any case an extreme indication as it refers to wine from cask and should be estimated according to distribution channels, selling market if not by each indication alone.

Against these perceptions, on the basis of the analysis results, the theory of commons is proposed to overcome the disputes related to the management of common goods to avoid both over-exploitation of scarce resources and high administrative costs (Ostrom, 2006). The most effective alternative is the creation of an external authority (*enforcement*) that might go beyond the current responsibilities assigned to the Consortium, which by working on the basis of rules commonly agreed upon by producers, would maintain the quality development of the coherent production with the safeguard of the product image. This so reinforced authority should intervene on the one side regarding the boundaries of the areas that are eligible and on the other side on the most restrictive quality parameters for the entire DOC production.

In case of Prosecco the tragedy of the commons may occur because Consortiums do not have legal or policy power to adjust (control) the wine supply according to demand changes (antitrust rules). In this context, market inefficiencies and volatility may spread along the supply chain (*i.e.* grape and bulk wine markets) worsening relationships among operators in the wine industry (*i.e.* between growers and processors or between processors and bottlers, etc).

Conversely, the game of prisoner's dilemma highlights the importance of "strategic behaviors" among Prosecco operators. When the game of prisoner's dilemma is repeated ad *infinitum* (*supergame*), players keep memory of past game result, *i.e.*, they increase their experience while appreciating and then maintaining cooperative behaviors (optimal social solution). According to the folk theorem, from repeated countless times games of prisoner's dilemma emerges endogenously a cooperative behavior (Fudenberg and Maskin 1986; Friedman 1971). Actually, the cooperative solution is strongly affected by the assumptions of the folk theorem

which do exclude the action of a central authority.

In case of logic of collective action, unless very small groups or unless people be forced by a central authority to act in their common interest “*rational, self-interested individuals will not act to achieve their common or group interests*” (Olson 1965). This theory is based on the assumption that individuals cannot be excluded from the enjoyment of a good they do not have incentives to supply that good. Conversely, when individuals cannot be excluded from benefits produced by a common resource, they are motivated not to contribute to their provision but to *free-ride* on the efforts of others. By extending the *free-ride* to all individuals the collective benefits will not produced (Ostrom 1990).

Solutions to avoid or to mitigate the tragedy of commons are basically referred to three models: i) a Leviathan solution, ii) the “privatization of the good”, iii) the agreement managed by a central authority. The first model implies the action of the “bureaucratic monster” as defined by Thomas Hobbes (1651), which requires, following the interpretation of Heilbroner (1974), a “strong central government”, or, in a less draconian approach, agencies or governments or international authorities. Carruthers and Stoner (1981) argue the need to develop policies able to centralize control of common resources. In the second model, the management of commons requires the privatization of common resources (Demsetz 1967, Johnson 1972). Smith (1981) suggests the preservation of public goods through a system of private property rights, which should be exclusive to avoid the overexploitation of resources (Welch 1983). The main weaknesses of this model concern the following aspects: i) how the good is divided into property subunits; ii) the assessment of units; iii) the negotiation of unit (*i.e.* fisheries, etc.). The third model refers to a compulsive and self-financed agreement among individuals which is managed by the central authority (Ostrom 2006). Assuming a non-cooperative scenario and following the prisoner’s dilemma game, this agreement can be considered as binding contract for players which are strictly controlled by the central authority. In this case the cost of enforcement should be added to the game while the agreement has to be universally reached among players according to the productivity of common resource. The main shortcomings of this model are: i) the under- or overestimation of the common resource ii) the monitoring activity may not work, iii) a player may not be able to comply with the contract *ex post*, even if he/she is assured to perform it *ex ante*.

4 Conclusions

Results from the SCP analysis and the impact of changing DOs can be jointly evaluated. We can then summarize results as the followings.

1. Results from the SCP analysis confirm the old DOC (Conegliano Valdobbiadene) is consistent with the theory of Clubs. All producers within the CV area claim the use of DOC as collective brand since they have realized over

Table 2: Trend in DOCG and DOC Prosecco area

	2008		Forecast		
	Hectares	Share (%)	Hectares	Share (%)	Change (%)
Area DOCG:	4,908	39.6	4,950	29.2	0.9
Conegliano Valdobbiadene					
Area DOC 'Prosecco':	7,473	60.4	12,000	70.8	60.6
<i>Provincia di Treviso</i>	6,853	55.4	6,964	41.1	1.6
<i>Veneto Friuli V. G.</i>	620	5.0	5,036	29.7	712.3
DOCG & DOC	12,381	100.0	16,950	100.0	36.9

Source: Data Prosecco Consortium, 2009.

Table 3: Trend in DOCG and DOC Prosecco wine (bottles 0.75 l)

	2008		Forecast		
	Bottles	Share (%)	Bottles	Share (%)	Change (%)
Area DOCG:	57,384,552	35.3	57,865,297	26.4	0.8
Conegliano Valdobbiadene					
Area DOC 'Prosecco':	105,219,840	64.7	161,248,309	73.6	53.2
<i>Provincia di Treviso</i>	96,490,240	59.3	93,587,520	42.7	-3.0
<i>Veneto Friuli V. G.</i>	8,729,600	5.4	67,660,789	30.9	675.1
DOCG & DOC	162,604,392	100.0	219,113,606	100.0	34.8
Production surplus*					
- DOC/DOCG	11,476,910		11,573,059		
- IGT/DOC			32,249,662		
TOTAL	174,081,302		262,936,327		51,0

Source: Data Prosecco Consortium, 2009. *) To be conservative, we assume an additional production of about 20% than the one admitted according to allowed grape yields.

two decades that the protection of Prosecco and its area safeguards they own interest. The producer' awareness on the Prosecco value has gradually reinforced by growing relationships among firms, area (soil type, slope, etc.), climate, farming methods, vineyard, i.e., the Prosecco *terroir* has been consolidated.

2. Conversion of Prosecco producers from DOC to DOCG is not a easily step since it implies further restrictions on production, greater costs while consumer may be not well informed about the meaning of DOCG.
3. The extension of Prosecco area implies a strong risk of increasing supply and squeezing market prices; consequently, the Prosecco market may collapse in few years;

Actually, the establishment of the new DOC instead of IGT may amplify a work in progress effect stemmed by the wine policy reform¹⁰ and domestic and international competitiveness.

Market risks cannot be overcome by changing DOs only. There are three main issues.

1. The management of converting producers in CV area from DOC to DOCG.
2. The management of DOC.
3. The control over market supply.

Let's talk about the first issue. The Club is still a good solution for DOCG producers because of the following advantages: i) it allows to fix the optimal Club size (number of producers) according to the Club constraints (*i.e.* area); ii) it allows a better control over the wine production through regulations (*i.e.* yield, vineyard renewal rate, discretion over the potential wine, etc.); iii) it has the option to admit new producers in order to reach economies of scale; iv) it has an high knowledge about spatial allocation of production; v) it has also the option to control the supply chain (from plantation, to cultivation, to wine production and sales); vi) it can introduce the wine traceability along supply chain (strong control over the wine variety); vii) the establishment of one Club can also avoid supply overexploitation or it can mitigate information asymmetries because of differentiated Prosecco' sold in the market (DOCG vs. DOC); viii) the Club can also improve the performance of marketing devices (*i.e.* promotion) since it encompasses a well-known variety such as Prosecco; ix) a Club associated with variety instead of origin¹¹ may better exploit the market power of variety since it enjoys both motivation benefits of the collective brand (wine origin, quality, safety) and potential benefits of using the

¹⁰The wine CMO reform allows to write the vine variety on label.

¹¹The wine CMO reform allows to put the variety name on the label.

variety as a marketing strategy; x) the Club would better managed the protection of property rights especially at international level when an agreement on European DOs as intellectual property rights will be reached; x) the may exert a strong lobby because of its monopoly power; xii) the can also strongly reinforced actions to protect Prosecco wine against international competition (*i.e.* a Club of Prosecco or International Club of Prosecco).

The offers also advantages in managing the brand by: i) a better control over supply quantity and quality; ii) avoiding strategic behaviors such as the supply of low price and quality wines which may endanger the reputation or image of Prosecco; ii) increasing the collective reputation of Prosecco; iii) orienting private choices toward a common interest in safeguarding even private brands; iv) limiting the competition by enforcing barriers to entry (*i.e.* merging private brands to the Club of Prosecco as variety); v) avoiding trivial actions (*i.e.* brands associated with low quality wines) which may have negative effects over Prosecco supply chain performance; vi) exploiting benefits of economies of scale in promotion campaigns; vii) overcoming the fragmentation of Prosecco brands especially on international markets.

All these advantages seem to encourage the establishment for DOCG management. However, this is not an easy task. In practice, the conversion of Prosecco producers from DOC to DOCG is not automatic process since it implies further restrictions on production, greater costs (*i.e.* enforcement costs) while consumers may be not well informed about the meaning of DOCG respect to DOC. In other words, premium price for producing DOCG instead of DOC may not compensate additional costs, thus, the profitability may reduce.

To alleviate the transition DOC/DOCG and to encourage producers to enter DOCG, the Consortium has started a varietal wine differentiation by exploiting some aspects of production area (*i.e.* "rive" or "hilly vineyard"¹²) or enforcing the production of *crus* selections. The promotion of DOCG among consumers is another activity sponsored by the Consortium and it is accomplished by the introduction of a new logo and a state band as well as by applying the traceability of Prosecco bottles to avoid speculative or imitative actions.

The second important question is the management of DOC area. Two main consequences can be drawn:

1. The success of Prosecco will attract new producers within DOC area; as consequence, the market equilibrium will be definitively altered.
2. The enlargement of Prosecco area represents a dangerous threat since new producers are mainly driven by strategic behaviors or speculative actions, *i.e.*, they behave as the prisoners dilemma (*laissez-faire*), since they are not interested in protecting relationships with territory that do not exist or they

¹²The name "Rive" refers to hills where the cultivation is hard because of strong slopes.

do not know. In this case the tragedy of commons lead to the erosion of Prosecco value as collective brand and *terroir*.

3. In practice, the strategic behaviors may generate the following effects between DOCG and DOC productions: i) a sort market cannibalism; ii) a spread in price and wine quality ratio; iii) a strong annual fluctuations in grape prices.

As reported in paragraph 2, the tragedy of commons is associated with lack in regulations. If the self-regulation of CV Prosecco producers has required more the 20 years to be reached, the idea of extending the same rules to the DOC area is not realistic. This issue arises because the Consortium does not have the power to control the wine supply (see paragraph 2). In this context, conditions for building a Club do not hold, i.e., the governance of commons should take a different pattern.

Actually, the governance may be addressed by proposing an exit strategy that includes three possible options: the Leviathan solution, the “privatization of the good”, the agreement managed by a central authority.

The first option, proposing a Leviathan action, can be hardly followed because: i) the supply is still changing over time; ii) there may be inefficiencies in monitoring (*‘erga omnes’*) all supply chain operators about the compliance of both production rules and aspects of marketing; iii) there may be mistakes in controlling operators (*i.e.* fostering opportunistic behaviors, wrong and not justified penalties).

The second option, concerning the privatization of the public good, seems to be not feasible for the evaluation and allocation of the “common good” Prosecco as units, through a system of property rights.

The third option may be applied to DOC Prosecco producers. In this case the enforcement would establish a set of rules, shared by unanimity or majority of wine producers (*i.e.* from the vineyard to the cellar, to the technical aspects of marketing and product distribution).

According to the third option, a central authority can enforce the wine quality requirements without the agreement of producers, reaching the following objectives: i) it can mitigate market inefficiencies ii) it can avoid risks of supply surplus (*i.e.* by raising the renewal rate of vineyards, reducing yields, etc.); iii) it can activate measures protecting the collective reputation of Prosecco (*i.e.* continuous and systematic sampling tests on quality of wines entering market and reporting of any fraud, falsification or adulteration to the competent authorities, etc.) iv) it can monitor wine stocks in real time (storing is a critical issue in Prosecco since the freshness of this wine do not allow a storage beyond one year); iv) in can resolve conflicts generated by free-rider behaviors (*i.e.* through actions on technical aspects) vi) it can better manage market crisis.

However, there are other difficulties within this governance. For instance, the agreement is not shared by all producers, the optimum supply size can be hardly estimated (overestimation or underestimation of production) or there is a loss in

controlling the supply chain (*i.e.* large number of operators) and then, some aspects or rules might not be fulfilled despite the more noble intentions agreed *ex ante*. In practice, there are two main points about the third solution: to enforce rules and to establish the authority enforcing controls.

So far, two main solutions have been proposed to limit or to regulate the wine supply: a) the identification of eligible areas (zoning); b) the enforcement of controls along the Prosecco supply chain (from the field to the bottle). In case of zoning, areas suited to wine production are recognized (soil type, climate conditions, etc.). The second option is focused on monitoring activities about “*erga omnes*” controls: i) on the vineyard (yields, vine density, etc.); ii) on wine processing and, eventually, on final tasting. The cost of enforcement is supported by producers¹³ (farmers or bottlers or both).

One of critical points is about the authority making these controls especially for tasting wine¹⁴. From most part a correct definition of Prosecco sensory profile is considered the most powerful activity in controlling wine supply.

So far, institutions such as the Ministry of Agriculture, Veneto Region as well as the Prosecco Consortium and Prosecco producers have done a lot of work but there are still many open questions. Regardless of solution that will be reached in the next future, what is really important is to avoid to exploit a common resource as Prosecco while maintaining the success of this wine over time.

References

Barisan L., (2010). *Strategie di sviluppo di un sistema vitivinicolo di successo: il caso del Prosecco*, Phd dissertation, Doctorate in Viticulture, Oenology and Marketing of Viticultural and Wine Firms, University of Padova.

Baumol. W., (1982). Contestable markets: an uprising in the theory of industry structure, *The American Economic Review*, vol. 72, n. 1, pp. 1-15.

Berglas E., (1976). On the Theory of Clubs, *The American Economic Review*, vol. 66, n. 2, pp. 116-121.

Boatto V., Rossetto L., Galletto L., Barisan L. (2009a). *An Outlook of a Successful Business: the Controlled Denomination of Origin Conegliano Valdobbiadene – Prosecco*, poster presentato al 16^{mo} International Symposium GiESCO 2009, 12-16 luglio 2009.

Boatto V., Balestrieri M., Barisan L. (2009b). Il Mercato della Denominazione Conegliano Valdobbiadene. In: AA.VV. *Rapporto 2009 – DOCG la Forza del Distretto per Gestire il Futuro*, p. 29-101, Treviso: Camera di Commercio di Treviso.

¹³The transaction costs is about 3 euro per ton of grape and 0,40-0,45 euro per hectoliter of wine.

¹⁴So far, the authority for tasting wine is the Chamber of Commerce but it delegated Consortia to do these tests.

- Buchanan J.M., (1965). An Economic Theory of Clubs, *Economica*, vol. 33, pp. 1-14.
- Carlton D.W., Perloff J.M. (2005), *Modern Industrial Organization*, 4th ed., Pearson Higher Education.
- Carruthers I., Stoner R. (1981). *Economic Aspects and Policy Issues in Groundwater Development*. World Bank Staff working paper No. 496. Washington DC.
- Demsetz H., (1967), Toward a Theory of Property Rights, *The American Economic Review*, vol. 57, n. 2, pp. 347-359.
- Hirschman A.O. (1970). *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*, Harvard UP, Cambridge Mass.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, 1990.
- Fudenberg D., Maskin E., (1986). The folk theorem in repeated games with discounting or with incomplete information, *Econometrica*, Vol. 54, N. 3, pp. 533-554.
- Heilbroner, R. (1974). *An inquiry into the human prospect*. W. W. Norton, New York.
- Olson M. (1965). *The Logic of Collective Action*. Harvard University Press.
- Perloff J.M., Karp L.S., Golan A., (2007). *Estimating market power and strategies*, Cambridge University Press.
- Pesarin, F (2001). *Multivariate permutation tests with applications in biostatistics*. Chichester: Wiley.
- Pesarin F. (2002). Extending conditional inferences to unconditional ones. *Journal of the Italian Statistical Society*.
- Rossetto L., Boatto V., Barisan L. (2010). Changing Geographical Indications Of Prosecco: Chances, Risks Or Threats?, paper presented to the workshop "The world's wine markets by 2030: terroir, climate change, R&D and globalization" within the national conference AARES held in Adelaide Australia on 8th-9th February 2010, pagg. 19.
- Salmaso, L., & Corain, L. (2004). *Multivariate And Multistrata Nonparametric Tests: The NonParametric Combination Tests*. *Journal of Modern Applied Statistical Methods (JMASM)*, 3 (2), 443-461.
- Smith R.J., (1981). Resolving the tragedy of the commons by creating private property rights in wildlife, *The Cato Journal*, vol. 1, n. 2, pp. 439 - 468.
- Johnson G., Omotunde E., (1972). Economic Analysis, the Legal Framework and Land Tenure Systems, *The Journal of Law and Economics*, vol. 15, pp. 259.
- Stigler G. J. (1968). *The Organization of Industry*. Homewood IL: Richard D. Irwin.
- Sutton J. (1991). *Sunk Costs and Market Structure*. Cambridge MA: MIT Press.
- Sutton J. (1998). *Technology and Market Structure*. Cambridge MA: MIT Press.

Welch W.P., (1983). The Political Feasibility of Full Ownership Property Rights: The Cases of Pollution and Fisheries. *Policy Sciences*, vol. 2, 165-180.