How do sparkling wine producers adopt a sub-appellation? Evidence from an exploratory study on heroic Prosecco Superiore Rive

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Abstract. This exploratory paper investigates why sparkling wine houses producing Conegliano Valdobbiadene Prosecco Protected Designation of Origin (CVPP) wines decided to adopt the sub-appellation "Rive" to increase the value of their wines. We estimated both logistic and generalized linear models to explain Rive sub-appellation (SA) firms' choice and market share, respectively. By using data gathered from CVPP producers, we divided wineries into two groups, namely, those that adopted the Rive SA and those that did not. By means of a stepwise procedure, we categorized factors that were likely to explain the Rive SA choice within a set of structural, marketing and wine tourism-related variables. The results showed that structural drivers such as the human capital of younger producers, firm size, resource endowments, wine production, and involvement in ad hoc promotional activities (i.e., Primavera del Prosecco) have the greatest effects on the choice of Rive SA. On the other hand, the effects of small sizes, cellar door sales, and key CVPP wine tourism events have emerged as vital factors in the growth of Rive SA in terms of market share. The adoption of the Rive SA may play an important role in supporting and valuing the work of a vine-growers community who have been able to transform the difficulties and the passion of vine cultivation on steep slopes parcels into distinguishing features and may help the CVPP Tutelary Consortium appropriately undertake promotional policies to differentiate wines and improve competitiveness. This could have positive effects on wine tourism, hospitality, and winery visits considering the recent recognition of the CVPP as the 55th Italian UNESCO World Heritage site.

Keywords: sub-geographical indication, Prosecco sparkling wine firms, intraregional wine differentiation, steep-slope viticulture, market differentiation, wine tourism strategies.

1. INTRODUCTION

Over the last few decades, the international wine market has dramatically changed by, inter alia, increasing the number of appellations and sub-appellations. Under the pressure of several market and socioeconomic forces,

the Italian wine supply has followed these developments towards a reference model of higher quality wines [1]. As evidenced by Scozzafava et al. [2], Italian wine legislation has designed a model that differs from the French model based on the hierarchical territorial classification, where vineyards or groups of vineyards are typically recognized for quality. Therefore, a new appellation (or sub-appellation) faces difficulties in attempting to become successful mainly for institutional, wine labelling, and market differentiation reasons [3-5]. However, some of these new designations may build a reputation of excellence as an acclaimed and successful collective brand [6].

In this context, Conegliano Valdobbiadene Prosecco Protected Designation of Origin (CVPP) appellations are encompassed within the most prominent case studies deserving of attention, with a supply of over 91 million bottles in 2018 [7-9]. The CVPP is made up of 15 districts (municipal areas), and it takes its name from the two main towns of the zone. It represents the top Protected Designation of Origin (PDO) for Prosecco, as it is rooted in a specific tradition, rural heritage, terroir, and landscape. Prosecco wine is made from the Glera grape variety and is obtained using the Martinotti method after secondary fermentation in pressure tanks. The Prosecco Reform (2009) provided by the Italian Ministry of Agriculture, upgraded the former CVPP's from DOC (Controlled Designation of Origin) to DOCG (Controlled and Guaranteed Designation of Origin), and instituted the new Prosecco DOC, which covers nine provinces belonging to Veneto and Friuli-Venezia Giulia regions [10]. It is the largest Italian wine PDO for the number of bottles (500 million bottles in 2020), most of which are exported worldwide [11].

The CVPP hierarchical quality model is in turn classified into three geographical levels. These levels are Superiore di Cartizze sub-appellation (SA), which is locally considered in the same manner as the first-growth or *grand cru* and represents 1.7% of the CVPP supply; Rive SA, a second-growth wine or small SA, which accounts for a proportion of 2.9%; and the basic Prosecco Superiore (PS), (i.e., the classical CVPP sparkling wine), which is the most widespread (95,4%) [12].

The first sub-appellation (1.5 million bottles sold) indicates absolute top-quality wines within the CVPP appellation. It comes from a subzone that covers just 107 hectares of vineyards in the borough of Valdobbiadene, where the maximum yield allowed by the disciplinary system is 12 tons of grapes per hectare. It has not changed its territorial boundaries since the CVPP was set up in 1969. Its supply has stabilized since the 1980s. Hence, the alternative decision to produce Superiore di Cartizze has substantially no chance of being devel-

oped by the CVPP's sparkling wine houses. Therefore, it can be excluded from the choice set due to the current CVPP's disciplinary rules. In contrast, a major choice in adding value to CVPP supply chains is through Rive SA's adoption strategy by replacing PS production. In July 2009, the Prosecco Reform introduced the Prosecco Superiore and Rive SAs, both stemming from the CVPP's Spumante (sparkling wine) DOC [10]. Production for the former is approximately 83.8 million bottles, and the maximum yield allowed is 13.5 tons of grapes per hectare. Rive SA production and yield lie between those already described for Superiore di Cartizze and Prosecco Superiore. In 2018, the Rive SA covered an area of approximately 249 hectares with a supply equal to 2.7 million bottles sold. Interestingly, over the 2010-2018 period, the number of bottles claimed under the Rive SA increased at a double-digit annual growth rate (15%), which is almost three times higher than that of the PS.

The term "Rive" indicates, in the patois of the local inhabitants, small parcels of steeply sloped vineyards that are characteristic of the area and where the best-quality grapes are produced (*sensu stricto*). This category of wine highlights the different expressions of the CVPP. Rive wines are often obtained from grapes grown in the steepest, highest-quality vineyards in a single borough or hamlet, thus emphasizing the characteristics that a terroir gives to the wine. The concept of the Rive SA as a brand arose as an answer to the awareness of the need to link the image of a wine to its terroir to highlight the synergies between soil, weather, grape and winegrower [13].

Within the CVPP appellation, 43 Rive wines are now allowed, of which 12 get their name from their borough and 31 from their borough's hamlet. Each terroir expresses a different and specific combination of soil, exposure, microclimate, and human factors. In the Rive, yields are limited to 13 tons of grapes per hectare, the grapes are picked exclusively by hand, and the vintage must be shown on the label. The Rive SA represents a viticultural potential of 83.7% of the CVPP area, of which 48.4% falls within the UNESCO "Core Zone," and the rest falls within the so-called "Buffer Zone" (Figure 1).

The marketing literature on geographical indications is rather vast and has mostly focused on the consumer side [2, 14, 15]. However, less attention on the supply side has been paid to sub-appellations or small appellations within larger ones. The soundness of SAs proposed for the Niagara Region of Canada has been investigated from both a consumer viewpoint [5, 16] and a *terroir* perspective [17]. In Europe, Gergaud and Ginsburgh [18] tested the *terroir* impact on the quality of Bordeaux wines. On the supply side, Cross et al. [19] show a strong impact of new SAs on vineyard sale prices with-

(a)   (b)
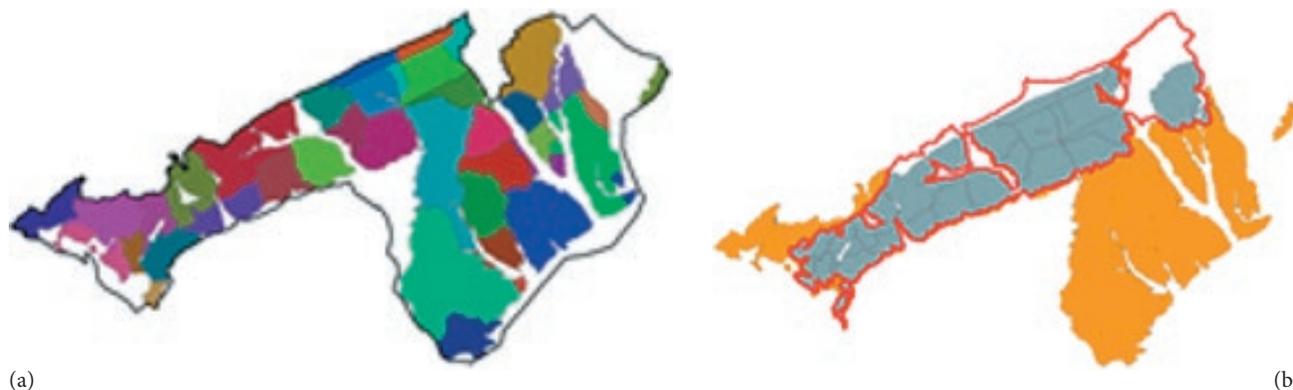
Figure 1. Rive SA: 43 sub-appellations within the CVPP area; (b) inside and outside of UNESCO's World Heritage Site (*bordered by the red line*).

in the Willamette American Viticulture Area (AVA), while Gokcekus and Finnegan [20] demonstrate that SA wine reputation premiums have increased significantly with their creation. The CVPP appellation is somewhat similar to the Willamette AVA, given that new SAs are superimposed within an existing, wide appellation.

According to the extant literature concerning the wine sector, the adoption of an SA is expected to bring benefits to firms, such as increased competitiveness through increased supply or greater market differentiation [21]. Given that some firms in the CVPP area use Rive SA, while others do not, this study aims to ascertain what factors make a difference in deciding to adopt Rive SA. This leads to the following research questions: 1) What are the drivers (i.e., structural, market and wine tourism-related variables) of the adoption of Rive SA? What is their relative importance? 2) Additionally, what structural, market and wine tourism-related factors have effects on the Rive SA share of the total CVPP sparkling wine sales?

This study focuses on two traditional CVPP sparkling wines (PS and Rive SA), where Rive SA can be considered a potential driver of innovation [22]. To consider the expected impacts of structural, marketing and wine tourism-related variables, a set of factors capable of explaining a firm's likelihood of adopting Rive SA was evaluated [23-26].

The CVPP's sparkling wine houses face an important decision regarding whether to adopt the Rive SA over PS or reject that innovation while maintaining the PS. Thus, weighing the pros and cons of adoption represents a challenging and temporary choice (i.e., made at the time of harvest selection).

– *Rive SA's advantages over PS*. Rive SA represents the sparkling wine of the "core zone". It has an image linked to heroic viticulture and Colline del Prosecco di Conegliano e Valdobbiadene, which is recognized as a UNESCO Heritage Site. This implies a role of the product in promoting wine tourism with higher CVPP quality. In their attempts to be more competitive and differentiate themselves, CVPP firms have a growing interest in adopting Rive SA over PS [26]. According to the CVPP's Research Centre for Market Studies and the CVPP's production specifications, on the one hand, the PS allows a maximum production of 12,600 bottles per hectare with an average price of 5.44 euros per bottle at the production phase; on the other hand, the yield of the Rive SA is 12,133 bottles per hectare with an average unit value of 6.23 euros per bottle. Consequently, other production costs being equal, the opportunity cost for giving up or postponing Rive SA adoption would consist of approximately 10% of the revenue.

– *Rive SA's disadvantages over PS*. The price differential between Rive SA and PS in the grape and base wine markets should be greater to properly sustain both higher labour intensity and its expanding effect among producers. Yet, compared to PS, the spread of Rive SA is more linked to the domestic market than to exports; given its recent creation, the promotion of Rive SA has not been established. Ultimately, consumers' knowledge of PS in a broader sense is stronger than that of Rive SA [27].

The paper is organized as follows. Section two presents the theoretical approach. Section three relates to the methodology and the data employed. Section four addresses the results, and section five discusses those results. Final considerations conclude the work.

2. THEORETICAL APPROACH AND HYPOTHESES

As argued by Rogers [28], the adoption of Rive SA can be contextualized as the process of deciding on the introduction of an innovation. The entrepreneur, to

start with, goes through a phase of acquiring knowledge about the rules of the product specification and then the assessments of conditions for its claims and of market demand, which leads to the formation of a positive or negative attitude towards the Rive SA when ultimately deciding whether to adopt the new SA.

The review of the literature has widely investigated the relevance of factors affecting the introduction of new geographical indications for wines. For instance, the process can be influenced by a wide variety of patterns [29-32], including cultural and psychological factors (e.g., belonging to a community of heroic winegrowers, personality, empathy); structural factors (e.g., land under cultivation, human capital, production size); marketing factors (firms' entries into new channels and markets, price positioning, branding); factors related to the development of wine tourism (e.g., visitor reception, wine events); and political factors (e.g., differentiation strategies implied by the Tutelary Consortium at the territorial level).

Thus, a broader framework can be applied to study the model for the adoption of SA by firms in the CVPP territory [33, 34]. The framework can identify group variables derived from the structure–conduct–performance model [35] that can influence the process by which firms adopt the Rive SA as a relevant innovation, i.e., the structural, marketing, and wine tourism contexts. This design is in line with similar research and strategies implemented in the wine industry [19, 20, 36, 37].

This study considers that the development of the conceptual adoption model assumes that the differentials in the vineyard yield per hectare, average selling prices and production costs between the PS and Rive SA in current and future years are known with certainty to winegrowers. Therefore, one can assume that the decision has low risk and uncertainty to properly portray the Rive SA adoption decision process; this process is aligned with the CVPP Consortium's aim to support the added value of the heroic viticulture wines of the Designation as a UNESCO World Heritage Site.

2.1 Rive SA adoption

Structural variables. According to the existing literature and empirical evidence, structural resources have been consistently identified as important factors for the adoption of a SA [13, 26, 38]. Winery size is supposed to affect the choice of introducing the Rive SA. However, the decision is challenging. On the one hand, large wineries have more possibilities to diversify their portfolios than small ones do. On the other hand, small wineries are more focused on local consumers who may be more interested in terroir features. Given this ambiguity

about the size effect, we include various size indicators in the model: the number of bottles, PDO surface, pressure tank capacity and three categories of employees. Considering the human factor, a younger entrepreneur is thought to be more likely to push for the adoption of new SAs. The amount of CVP bottled by third parties should imply a lower incentive to use SAs, as more third-party bottling indicates a weaker tie to the wine-growing area. A similar consideration may apply to the quantity of purchased grapes to be crushed in the winery, given that this can be an obstacle to a strong supply identity based on a winery's own grapes. Therefore, it is reasonable to hypothesize the following:

H1: Firms with higher levels of human factors, owned structural endowments, and commercial size are more likely to adopt Rive SA than firms with lower levels.

Market variables. The company's decision to adopt Rive SA may also be influenced by market or distribution channel conditions [22, 39, 40]. A possible impact on Rive SA adoption may derive from a higher tendency to favour selling to the domestic market in comparison with the export market, as Rive SA is arguably more acknowledged and appreciated by Italian consumers. The degree of use of some marketing channels may also favour the Rive SA; e.g., a large share of Prosecco sold by winery shops or in the Horeca channels, where quality and reputation affect the outcome more than in other outlets, would imply higher interest for the Rive SA, while the opposite would happen for a large share sold to the mass market, i.e. Large scale retail (LSR). Hence, we can hypothesize the following:

H2: Firms with higher Italian market shares and higher penetration rates in the wine shops or in the Horeca channels are more likely to adopt the Rive SA than firms with lower shares and rates.

Tourism variables. Since "Rive" sparkling Prosecco is linked more strongly to terroir, viticulture tradition and landscape than Superior Prosecco is, we can expect that a strong involvement of wineries in wine tourism may increase the probability of including this sub-brand in their portfolio [41]. To verify and clarify this aspect, we test the number of visitors and propose the hypothesis that the greater the involvement in certain events, the greater the likelihood of adopting the Rive SA [42, 43]. Therefore, we hypothesize the following:

H3: Firms with higher levels of involvement in wine tourism and particularly in events organized on-site are more likely to adopt Rive SA than firms with lower levels.

Although this paper's main issue concerns Rive SA adoption by CVPP wineries, a secondary field of investigation is the intensity of this adoption, i.e., its share of total CVPP sparkling wine sales. In particular, we are interested in verifying the effect of two variables on it: the share of direct sales on total sales and winery size. Given previous considerations, the former is expected to affect Rive SA market share, while the latter should reduce it.

The lack of investigation on SA choice makes our analysis explorative. Therefore, in achieving the two goals of our research, we have not estimated models based on specific sets of variables; rather, we have attempted to select sets of variables among those suggested by the previous theoretical considerations.

3. MATERIAL AND METHODS

3.1 Quasi-census study and data collection

The study is based on 2017 data, and the sample is made up of 158 wineries that produce sparkling CVPP, 38 of which have chosen the Rive SA. The data were collected through an ad hoc survey using the listed CVPP's sparkling wine house members. The survey showed a very high response rate (over 89%), which was yielded by face-to-face interviews with the business owner and/or the firm's management representatives while ensuring that gathered data were treated anonymously with confidence and sensitivity. Although some firms were initially less inclined to participate in the survey, they were persuaded to take part after some telephone reminders.

The population distribution was analysed using data coming from the certification bodies in charge of Prosecco production control [11] by using strata based on bottled production. The variable distribution from this database was compared with our dataset by considering the size of the bottled production sold annually (standard = 0.75 litres) and avoiding omitting the largest companies. Hence, our data represent a quasi-census study having specific representativeness of the surveyed population. The remaining share of sparkling wine houses (11%) did not respond to the research because they were either too busy to participate or not available to provide the requested information.

3.2 Variables

The following is the list of dependent and explanatory variables that were used in the analysis for this paper.

The dependent variable is a discrete binary variable that is assigned a '1' if the firm has already adopted the Rive SA; otherwise, the firm has adopted the PS (Prosecco Superior SA firm) and is thus assigned a '0'.

The explanatory variables were grouped into three components. The explanatory variables were grouped into three components (Table 1). The first group concerns structural variables, the second group of variables relies on the conduct of firms in the industry by markets and sales channels, and the third group considers the performance of wine- and tourism-related events [44].

Regarding structural assets, marketing skills (i.e., young commercial employees, young CEO, oenologist, young owner), physical and technological resources (i.e., Glera Docg surface, purchased grapes, own wine production, storage capacity of pressure tanks, under-contract bottling,) and firm size (i.e., small-, medium-, large- and very large-) have been analysed and implemented following a criterion that focuses on the importance of human capital and firm resources as crucial dimensions in Rive SA's innovation processes. All the variables are numerical, except for both owner and size, which were transformed into factors with two and four levels, respectively.

In the framework of market conduct, the model used tries to capture, in terms of the competitive strategy, the effects of Rive SA on market share of CVPP firms in Italy and abroad and on the domestic market through distribution channels (i.e., wine shops, Horeca, large-scale retail, wholesalers, e-commerce and others) and major export markets (i.e., Germany, the United Kingdom, Switzerland and the United States).

Wine tourism events were assessed considering: a) actions aimed at promoting CVPP wines and b) their performance in pursuing wine tourism policies. Drivers have been defined to capture the effects of how important the economic return of major wine events was (Likert scale from 1 to 5 points) and the number of visits per winery [45]. The major wine events, ranging from domestic to international, with a significant impact on CVPP firms, were as follows. Conegliano Valdobbiadene's Wine Festival is the most important event devoted to CVPP and takes place in May at the Castle of San Salvatore. Conegliano Valdobbiadene's Prosecco Wine Route was created in 1966 (the first Wine Route in Italy) as an oenological circuit covering the entire hilly area. Additionally, the major sporting events in the CVPP area (e.g., Prosecco Cycling Classic, Prosecchissima and Tour of Italy) were grouped. Vinitaly is among the most important international wine festivals and takes place in Verona. The Cantine Aperte ("Open Cellars") is one of Italy's major wine tourism events.

Table 1. Overview of the explanatory variables used in the models.

Variable description	How the variable was measured	References
Structure:		
Vineyard employees	Numeric	[33]
Winery employees:	Numeric	[33]
Oenologists	Numeric	Self-developed
Young[a] commercial and sales	Numeric	Self-developed
Young CEO	Numeric	Self-developed
Young owner	1 if any, 0 if not present	Self-developed
Glera DOCG[b] vineyard surface	Hectares	[33]
Purchased grapes crushed	Thousand tons	Self-developed
Own wine production	Hectolitres (in thousand)	Self-developed
Storage capacity of pressure tanks	Hectolitres	Self-developed
Under-contract bottling	Bottles produced (in thousand)	Self-developed
Firm size[c]	Bottles sold (in thousand)	[7, 46]
	1=small-sized (less than 150,000 bottles sold), 0=otherwise	[7, 47]
	1=medium-sized (150,001-500.000 bottles sold), 0=otherwise	
	1=large-sized (500.001-1.000.000 bottles sold), 0=otherwise	
	1=very large-sized (more than 1,000,000 bottles sold), 0=otherwise	
Conduct:		
Market share in domestic and foreign markets	Percentage of bottles sold (%)	[15, 48]
Italy	Percentage of bottles sold (%)	
Direct sales (%)	Percentage of bottles sold (%)	
Hotellerie-Restaurant-Café and Wine Bar (%)	Percentage of bottles sold (%)	
Large-scale retail (%)	Percentage of bottles sold (%)	
Wholesalers (%)	Percentage of bottles sold (%)	
E-commerce (%)	Percentage of bottles sold (%)	
Other channels (%)	Percentage of bottles sold (%)	
Major export markets:	Percentage of bottles sold (%)	
Germany	Percentage of bottles sold (%)	
Switzerland	Percentage of bottles sold (%)	
United Kingdom	Percentage of bottles sold (%)	
United States	Percentage of bottles sold (%)	
Performance:		
Visitors per winery	Numeric	[19 45, 46]
Major wine tourism events:		
Conegliano Valdobbiadene's Wine Festival	1= Not at all important; 2=low importance; 3=important; 4=very important; 5=extremely important	
Vinitaly		
Prosecco Wine Route		
Cantine Aperte ("Open Cellars")		
Sports events		

[a] Less than 40 years old. [b] Appellation of Controlled and Guaranteed Origin. [c] Categorial variables were developed according to CVPP's Research Centre for Market Studies.

3.3 The model specification

To find the determinants of Rive SA choice, we estimated a logistic regression, which is a model broadly employed to examine the factors that affect a binary outcome such as undertaking an action [49, 50].

The logistic regression model allows us to identify the variables that have the most impact on the choice to use the Rive SA for branding. We modelled the probabilities of the outcome based on producer characteristics and marketing behaviours. More specifically, this technique determines the significant drivers for classifying a winery as belonging to the Rive group or to the other group. Therefore, it offers a "prognosis" (or propensity) relative to adopting the Rive SA.

Logistic regression represents a way to evaluate factors affecting the decision to produce a sparkling wine under the Rive collective brand. Briefly, for each winery in our sample (i=1...n), the dependent variable Y_i indicates the following values: 1 if the winery chooses the

Rive SA and 0 if the winery does not choose the Rive SA but instead remains with the Superiore SA. The probability of choosing the Rive SA is as follows:

$$\Pr(Y_i = 1 | X_1, X_2, \ldots, X_k) = \frac{e^{\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}}}{1 + e^{\beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki}}}$$

where β_k is the estimate of the kth parameter and X_{ki} is the k-th characteristic of the ith winery.

Although, as we discussed earlier, economic theory may suggest some reasons in favour of the Rive SA choice, we have not made any a priori assumptions about which variables should be included in the model.

Furthermore, a generalized linear model approach was used to determine the main drivers for Rive SA market share by employing the same candidate variables as those of the logistic regression [51, 52]. Therefore, the estimations of both models rely on an exploratory stepwise procedure.

3.4 The data analysis

In our initial table of descriptive statistics, we present t-tests of differences in variables according to Rive SA or non-Rive SA.

In the stepwise logistic regression model-building procedures, backward selection, rather than forward selection, has been used to avoid the so-called suppressor effect [50, 53]. As suggested by Snipes & Taylor [54], to discover the best logistic regression model, Akaike's criterion was used to support the model choice. As argued by Bendel & Afifi [55], to ensure less risk of failure when trying to find a relationship between explanatory and dependent variables when one exists, the usual $p < 0.05$ statistical significance criterion has been relaxed to 0.10. In the tables of results, we have reported not only the estimated coefficients and associated odds ratios but also the marginal effects of each variable. The marginal effects are the change in the probability that a winery chooses to produce Rive SA sparkling wine due to a unit change of a specific independent variable. To estimate the marginal effects, we have followed the approach where marginal effects on the binary dependent variable are computed by using the command 'margins' in Stata, as suggested by Cameron and Trivedi [56].

A generalized linear model (GLM) was fit using the maximum pseudolikelihood algorithm to estimate Rive SA's market share, which is its proportion on total wines sold in the firms' portfolio of Prosecco wines. This variable was rescaled into a range between 0 and 1. We used a binomial family GLM, link to logit, following the method proposed by Papke and Wooldridge [57], which was subsequently and particularly enhanced in Stata by Baum to handle with fractional response data [58]. To model the data, we jointly considered the Akaike information criterion (AIC) and the Bayesian information criterion (BIC) [54] [59].

4. RESULTS

The results that examine the hypotheses of the study are presented considering a) the direction and significance of the differences between the average value of the variables for adopting and not adopting Rive SA and b) the contribution of the various independent variables to explain the adoption of Rive SA using logistic regression. Findings about the main drivers of Rive SA market share conclude the paragraph.

4.1 Differences between Rive SA adopters and non-adopters

The results of the t-test for the homogeneity of the means are shown in Table 2.

First, the differences between the average value of the group of Rive SA adopters and that of nonadopters are positive for some crucial structural variables, while they are negative for a firm's own-grapes crushed and small-size firms. Among the former, the differences between the variables' average values are statistically significant for PDO area under cultivation, higher firm commercial size (i.e., large, and very large firms), number of winery employees and young commercial and sales staff, young owner, share of production under contract, own grapes crushed, and winery pressure tank sizes. Second, when detailing the analysis of the leading foreign markets, only the US shows a significant difference that is higher for Rive SA. Only the difference in large-scale retail market share is negative and almost significant. Third, the level of involvement in communication activities such as Vinitaly and Primavera del Prosecco (i.e., Prosecco Spring) show significant differences between the groups of firms.

Therefore, these first outcomes appear to confirm hypotheses 1 and 3 previously formulated (see paragraph 2) but seem to be inconclusive for hypothesis 2. The following estimates from multivariate logistic regression contribute to providing further insight into the relationship between the set of independent variables and the dependent binary variable.

4.2 Factors influencing Rive sub-appellation adoption

The results of logistic regression are presented in Table 3. According to Pregibon [60] and Mehmetoglu

Table 2. Sample winery description: t-test results comparing Rive and Prosecco Superiore firms.

Variables	Mean (Rive=1)	Mean (Rive=0)	p-value
Structure:			
Vineyard employees (no.)	2,16	1.49	0.148
Winery employees (no.)	8,13	4.93	0.069
Oenologist (no.)	1,71	1.44	0.178
Young commercial and sales (no.)	2.32	0.64	0.006
Young CEO (no.)	0.18	0.11	0,248
Young owner (dichotomous)	0.42	0,25	0,043
Glera DOCG vineyard surface (hectares)	13.51	7.00	0.001
Own-grapes crushed (tons)	20.60	90.55	0.002
Purchased-grapes crushed (% of total grapes)	13.42	24.59	0.092
Own wine production (thousand hectolitres)	4.72	2.22	0.158
Production bottled under contract (% of total bottles)	2.50	14.90	0.002
Pressure tank capacity (thousand hectolitres)	7.05	2.87	0.048
Firm size (thousand bottles):	1,665.00	928.59	0.231
Small-sized (dichotomous)	0.29	0.63	0.000
Medium-sized (dichotomous)	0.29	0.19	0.203
Large-sized (dichotomous)	0.16	0.05	0.029
Very large-sized (dichotomous)	0.26	0.13	0.061
Conduct:			
Italian market share by channels (%):	70.87	74.81	0.391
Direct sales (%)	25.31	32.03	0.266
Hotellerie-Restaurant-Café and Wine Bar (%)	46.19	39.22	0.205
Large-scale retail (%)	0.50	5.48	0.078
Wholesalers (%)	19.66	17.70	0.685
E-commerce (%)	0.32	0.35	0.918
Other channels (%)	5.40	5.23	0.950
Export shares by major markets (%):	29.13	25.19	0.391
Germany (%)	18.02	15.31	0.538
Switzerland (%)	8.72	15.75	0.090
United Kingdom (%)	8.25	9.96	0.638
United States (%)	14.42	6.16	0.008
Performance:			
Wine tourism:			
Visitors per winery (no.)	2,796.16	1,668.96	0.250
Wine event involvement (1-5 points Likert scale):			
Conegliano Valdobbiadene's Wine Festival	2.45	2.08	0.203
Vinitaly	3.13	2.43	0.027
Primavera del Prosecco	3.32	2.68	0.026
Prosecco Wine Route	2.74	2.90	0.549
Cantine Aperte	2.42	2.42	0.988
Sports events	2.55	2.14	0.098

and Jakobsen [61], the assumptions that the model is good and correctly specified were tested by link test, $p = .000$ for linear predicted value and $p = 0.793$ for squared predicted value variables. A likelihood ratio (LR) chi-square test showed that the model with the constant and the set of explanatory variables is able to explain Rive SA adoption significantly better than the model with the intercept only, $\chi^2 = 59.05$ (with 10 degrees of freedom), $p < .001$. However, the Hosmer–Lemeshow (H-L) test, which was computed from the chi-square distribution with eight degrees of freedom, did not indicate lack of fit ($p = 0.100$). This empirical evidence indicates that this group of variables contributes significantly to explaining the choice of CVPP firms to adopt or not to adopt Rive SA. The estimated value of McFadden's R^2 is 0.339, which suggests that it is quite good for cross-sectional data. In CVPP firms, this model can screen for likely Rive SA adopters with a sensitivity of 55% and a specificity of 94%.

The direction of the estimated effects is generally in line with expectations. Regarding the group of structural variables, marketed bottles[1], Prosecco base wine production, and young owners are positively and significantly associated with the adoption of the Rive SA, while the percentage of purchased grapes has a negative effect on the propensity to adopt the Rive SA.

Among these explanatory variables, winery size is the most significant. The analysis of the marginal effects indicates that the probability of adopting the Rive SA increases by 25 percentage points for medium-sized wineries and by 48 points for very large wineries in comparison with small wineries. The larger the Prosecco base wine production is, the more likely the Rive SA choice is; i.e., one hundred thousand hectolitres increase the probability of adopting the Rive SA by approximately 7 percentage points. The presence of a young owner was a less significant variable ($p = 0.060$). Wineries with the last feature have a propensity to adopt the Rive SA that is 2.7 times greater than for those who do not. Marginal effects show that, ceteris paribus, the probability of the Rive SA, when a young owner is present, increases by 11 percentage points.

Among the independent variables relating to market share, only the use of LSR appears to affect the propensity to adopt Rive SA by undermining it, although less relevantly than the other factors. More specifically, the analysis of the marginal effects for different values of LSR share shows that when this variable is above 10%, the probability of the Rive choice becomes almost zero. It may be argued that the role of distribution channels

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[1] Splitting the number of marketed bottles into three binary variables has performed better than dealing with it as a single numerical variable.

Table 3. Logistic regression model.

Variable	B	St. err.	Odds ratio (β)	p values	Marginal effects
Human capital and productive structure:					
Young owner (dichotomous)	0.983	0.523	2.672	0.060	0.113
Medium-sized (dichotomous)	2.125	0.600	8.370	0.000	0.245
Large-sized (dichotomous)	3.114	1.008	22.520	0.002	0.358
Very large-sized (dichotomous)	4.211	0.953	67.435	0.000	0.485
Purchased grapes crushed (% of total grapes)	-0.034	0.010	0.967	0.001	-0.004
Own wine production (thousand hectolitres)	0.057	0.022	1.058	0.012	0.007
Market Conduct:					
Large-scale retail (%)	-0.238	0.117	0.788	0.041	-0.027
Wine tourism events:					
Primavera del Prosecco (score=3)	1.813	0.787	6.127	0.021	0.209
Primavera del Prosecco (score=4)	1,794	0.738	6.015	0.015	0.207
Primavera del Prosecco (score=5)	2.180	0.985	8.842	0.027	0.251
Constant	-3.684	0.781	0.020	0.000	
Goodness-of-link test:					
Linear predicted value	0.000				
Squared predicted value	0.793				
Goodness-of-fit test - χ^2	0.568				
LR χ^2 (11)***	59.05				
H-L's test	0.100				
McFadden-R^2	0.339				
AIC	137.27				
BIC	170.96				

Notes: Number of observations = 158. Goodness-of-link test calculated according to Tukey [62] and Pregibon [60]. The goodness-of-fit test was tested following Hosmer et al. [63]. Akaike's information criterion (AIC) and Bayesian information criterion (BIC). Sensitivity = 21 firms out of 38 (55.3%), specificity = 113 firms out of 120 (94.2%), positive predictive value = 21 firms out of 28 (75.0%), negative predictive value = 113 firms out of 130 (86.9%), predictive accuracy = 134 firms out of 158 (84.8%).

is overshadowed by the firm size, given a sort of channel specificity according to the size. However, we found no large variance inflation factors (all lower than 3), suggesting that collinearity was not a substantial problem between firm size and distribution variables[2].

Primavera del Prosecco, which is a proxy for wine tourism events, is positively and significantly related to Rive SA adoption. For wineries rating Primavera del Prosecco from important (3 points) to extremely important (5 points), the propensity to use the Rive SA increased by a minimum of 6 to a maximum of 9 times in comparison to wineries poorly scoring this event[3].

The marginal effects show that the probability of adopting the Rive SA increases by 21-25% if the winery is involved in the Primavera del Prosecco and gives this event an importance score equal to or higher than 3 points.

4.3 Drivers of the Rive SA market share

The goodness of the link test has provided evidence that the model was correctly specified concerning linear predictors ($p = 0.000$), regardless of whether the regression equation specification error test indicates that the model has no omitted variables. Other statistic indicators appear satisfactory as well; among them, results did not show a large value of the condition index (17.1), implying that multicollinearity is not a problem [64].

Table 4 presents the GLM regression results for Rive SA market share determinants.

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[2] The variance inflation factors for reported distribution channels (2.48 for Direct sales; 1.80 for Hotellerie-Restaurant-Café and Wine Bar; 1.90 for Large retail scale) when firms' size was included in the model (1.76 for medium-sized; 1.52 for large-sized; 2.92 for very large-sized) were quite small.
[3] Using the Primavera del Prosecco score as multiple binary variables has performed better than dealing with it as a single categorical variable.

Table 4 – Generalized linear model: drivers for Rive SA market share.

Variables	β	St. err.	z value	p value
Structure:				
Small-sized (dichotomous)	1.630	0.485	3.36	0.001
Conduct:				
Italy (%)	-0.042	0.009	-4.51	0.000
Direct sales (%)	0.033	0.012	2.75	0.006
Performance:				
Primavera del Prosecco (score=4)	1.142	0.421	2.09	0.036
Prosecco Wine Route (top scores=4 and 5)	0.748	0.399	1.88	0.023
Constant	-1.271	0.503	-2.52	0.012
Goodness-of-link test:				
Linear predicted value	0.037			
Squared predicted value	0.344			
Condition number	17.1			
Log pseudolikelihood	-9.970			
Deviance	4.347			
AIC	31.399			
BIC	41.225			

Note: Number of observations = 38. GLM fitted using Newton-Raphson (maximum likelihood) optimization; distribution family (Binomial); link function (Logit) [59]. The goodness-of-link test was calculated according to Tukey (1949) and Pregibon [60]. Multicollinearity diagnostics followed procedures found in Belsley, Kuh, and Welsch [64]. Akaike's information criterion (AIC) and Bayesian information criterion (BIC).

First, the coefficient related to small-sized firms exhibits a positive sign and significant relationship with market share (p = 0.006), which supports the statement that smaller sizes create greater value in wine portfolios through the growth of Rive SA.

Second, the results show positive and significant effects of direct sales (p = 0.006), while for the role of Italian market, a negative impact is shown, which indirectly confirms that product growth is currently not linked to other domestic channels, which do not have closer relationships between producers and customers as much as direct sales [65];

Finally, the positive coefficients of the organized wine tourism events suggest that the Prosecco Road and the Primavera del Prosecco are positive and significant tools (p = 0.061 and p = 0.036, respectively) to promote growth and achieve the strategic objectives of Rive SA firms.

5. DISCUSSION

The three hypotheses stated at the beginning of the work find partial confirmation from the t-test analysis. The logistic regression model reinforces the validity of H1 and H3 by deepening the effect of the most explicative variables.

Given that Rive SA is a type of marketing innovation, younger entrepreneurs are more inclined to adopt it in comparison with those who are older. Moreover, it seems the only human factor that matters in the Rive SA choice. Among structural factors, both basic wine production and marketed bottles play the most important role. We observe that as winery size increases, it is more likely that the winery will include the Rive SA within its wine portfolio. When the number of end markets, channels or consumer segments grows, the need to rely on a wide diversified assortment of Prosecco by not simply using the traditional residual sugar content (brut, extra dry, dry) drives a winery to explore other products, such as those that can be produced in the Rive SA. Both the marketed bottles and basic wine enlighten a specific contribution to the model. In fact, to understand how they can coexist in the logistic model, we have to consider that the latter can only partly be transformed into bottles of sparkling CVPP to be sold by the winery: part can be sold as bulk wine to plain bottlers [5], part can be reclassified and sold under other appellations. As expected, the purchase of grapes from other estates does not favour a propensity for Rive SA adoption. The analysis of marginal probabilities for different percentages of purchased grapes shows that, for medium-high percentages, the likelihood the winery uses the Rive SA is reduced to nearly zero. Therefore, it seems quite clear that Rive SA is viewed as being strongly rooted in the *terroir* of the firm's vineyards and is closely linked to the concept of "estate-bottled" sparkling Prosecco.

If the t-test results show that wineries choosing the Rive SA are significantly more involved than others in the first Italian wine event (Vinitaly), where both wine differentiation and portfolio diversification play a crucial role in achieving successful public relations, the logistic model underlines that they are even more involved in the wine tourism business. In fact, the propensity to adopt Rive SA increases when wineries give a rating of 3 or more for the main wine tourism event, i.e., the "Primavera del Prosecco".

With reference to market features, hypothesis 2 seems to be rejected because neither the effect of the domestic market share, nor the penetration rate in the wine shop nor in the Horeca channels can be assumed to be significant factors driving the Rive SA choice. Only

the share of bottles marked through LSR is somewhat important for this choice. Hence, because the share of bottles sold by other channels does not seem to significantly affect the choice of SA use, we can conclude that the distribution policy can be an obstacle to it only when the winery has a nonnegligible interest in the mass market. A similar consideration may be applied for sales in specific foreign markets. Their shares do not significantly influence the choice, a fact that could partially depend on the relatively new definition of the Rive brand and knowledge of it based mainly on local consumers.

Regarding the main factors affecting Rive SA market share, we observe that the two hypotheses previously formulated are well confirmed. Once a winery has chosen the Rive SA option, its weight in the total Prosecco wine supply increases with its cellar door share, which depends both on local customers and wine tourists, while it decreases with the firm's size. Therefore, considering previous results, we can conclude that while winery size positively influences the adoption of SA, once it has happened, it plays a negative role in the weight of the Rive SA in the winery sparkling wine assortment, where the Rive SA has to compete with an increased number of CVPP labels as the firm size grows. Moreover, being too focused on other domestic channels other than direct sales, where the interest in a SA subdivision is likely to be lower, may divert attention from improving the SA proportion in the CVPP portfolio.

Involvement in wine tourism is confirmed to be important in also determining the SA share. In fact, in addition to the variables included in the logistic model, the high scores attributed to both the Prosecco Wine Route and "Primavera del Prosecco" show a significant impact on the dependent variable. Hence, we can argue that, as the French wine classification system shows [66], a process of intense subdivision within a geographic region is much more effective when it is accompanied by sound wine tourism perspectives, which rely mainly on a considerable number of people willing to obtain a remarkable experience in the wine world.

6. CONCLUSIONS

This survey highlights the relevance of structural, market-related and wine tourism-related features in explaining SA adoption choice by measuring how these features can contribute to supporting and valuing a sparkling wine produced with considerable efforts by heroical vine-growers (Rive SA) within the CVPP.

Among them, we want to stress the increased likelihood of using Rive SA as business size (however measured) grows. If the linkage with wine tourism involvement was rather expected, this was not straightforward given that it could also be supposed that small wineries focused on niche markets would have better appreciated the new SA as a tool to better differentiate their small sparkling Prosecco products from that of other producers [67]. We can hypothesize that a core business based on a consolidated simple portfolio and a reduced level of flexibility in comparison with larger producers may contribute to explaining this empirical evidence.

Our study suggests the CVPP wineries key-conditions for benefitting of the Rive SA:

– to be strongly rooted in their land (i.e., to be as much as possible self-sufficient for grape production);
– to undertake a coherent strategy, based on the values of a heroic SA coupled with the prestige of the Unesco World Heritage, whereas the values preservation of the local culture is a core subject to work for the common good of that wine community;
– to promote the knowledge on Rive SA, by boosting sales especially at the cellar door, which represents the best channel to communicate consumers the values embedded in the Rive brand;
– to get actively involved in crucial wine tourism events to build and operate higher value-generating positioning (i.e., Primavera del Prosecco, Prosecco Wine Route, etc.).

In a scenario where Prosecco is becoming increasingly popular worldwide, the knowledge of factors that make Rive SA adoption likely may help the Tutelary Consortium define an appropriate promotion strategy to widen the use of Rive SA among CVPP producers as a tool for further differentiating their Prosecco along with their own brand. It should be based on four aspects to be considered:

– to looks to a model for economically and technically sustaining heroic viticulture and vine-grower's backbreaking work, to preserve socio-economics and cultural values, landscape and biodiversity values [68-70];
– to implement distinguishing promotional activities with in-person information, exclusively in the cellar door and in Horeca channels, which are the most relevant in generating higher value for consumers [71];
– to improve the ties between Rive SA and landscape values, which can be grasped passionately by the territorial firms, thanks to key wine tourism events promoted in the Prosecco Hills of Conegliano and Valdobbiadene (i.e., Conegliano Valdobbiadene's Wine Festival, UNESCO World Heritage Site's Association, etc) [45];

– to maintain careful and close control of the quality from the grapes selection phase to the sales phase (i.e., through ad hoc members' courses and training, etc).

Our study has some limitations. First, this research is focused on CVPP firms that produce sparkling wines in a SA in Italy. Second, while the most significant drivers in Rive SA adoption were identified, they do not represent the whole of sparkling wine production in Italy or, for example, sparkling wines in other areas with steep-slope viticulture. Third, further research on this topic is necessary over time to capture changes in firm strategies depending on circumstances (i.e., due to the market or the Protected Designation of Origin's product specification rules) that can enable or constrain SA adoption.

Finally, the results should be viewed as a first step in the attempt to build a theory of SA economics concerning drivers that support the firm's choice of a SA. We believe that our study provides useful intuitions for those who would broaden this research strand in different countries with other specificities.

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