

Wine industry perceptions and reactions to the COVID-19 crisis in the Old and New Worlds: Do business models make a difference?

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Abstract

The COVID-19 crisis has severely impacted the wine industry, with producers in different countries affected differently and, therefore, differing in their perceptions toward it. These differing perceptions are assumed to be due to different business models, mainly linked to the distribution system adopted and resulting in varying distances of producers to distributors and consumers. While upstream integration characterizes the Old World, the New World applies a downstream business model, being more closely linked to distributors and consumers and, therefore, more vulnerable to shocks, which should lead to higher perceived impacts of the COVID-19 crisis. This study analyzes 542 surveys collected from wineries in nine countries, divided into New World, historical Old World, and emerging Old World. Econometric results show statistically significant differences in both the perceived impact of COVID-19 and wineries' responses in terms of planned investments, with the New World being more affected. A common desire by wineries to direct future investments towards direct-to-consumer sales and

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communication was found, to the detriment of investments in vineyards and cellars. This desire is particularly strong in the New World, in line with their focus on the downstream part of the value chain, underlying their greater reactivity to shocks and capacity to innovate. [EconLit Citations: D22; L21; L66; Q13].

KEYWORDS

business models, COVID-19 crisis, (logistic) regression analysis, Old World New World, wine industry

1 | INTRODUCTION

The impact of COVID-19 on wine consumption, sales, and international trade has been widely analyzed and commented on in the press and academic journals (Cardebat et al., 2020; Rebelo et al., 2021; Wittwer & Anderson, 2021). These studies reveal the extent of the crisis facing the wine industry as well as the impact on the wine market. Globally, the wine market experienced a very strong contraction in the spring of 2020. The on-premise wine market collapsed with lockdowns limiting business and movement of people in many wine-consuming countries. By contrast, e-commerce has grown exponentially in 2020 (Nesin, 2020). A series of studies conducted by Wine Intelligence (2020) revealed that the wines sold are no longer the same. In particular, entry-level and mid-range wines or bag-in-box wines are preferred by consumers (Rebelo et al., 2021; Dubois et al., 2021). While these issues, related to consumption and sales, have been widely documented, the academic literature is almost nonexistent in respect of the consequences for wineries. However, this crisis could lead to major upheavals in this sector, as some business models seem, a priori, more resilient than others.

In Europe, the sector has been supported by a distillation plan and the private storage of quality wines that some countries have used,¹ allowing producers who wish to do so, to transform their wine into pure alcohol for the manufacture of hydroalcoholic gel. In the rest of the world, while not all vineyards have benefited from such support, they may not necessarily have experienced the same situation. There are marked particularities between the different wine-producing countries. Specific business models exist that could justify a difference in perception with regard to the current crisis in the sector (Alonso Ugaglia et al., 2019). Furthermore, different business models can also be expected to lead to different reactions from wineries (Andrieu et al., 2021). While we do not propose a comprehensive theory of firm behavior regarding the reactions to the crisis, we offer a framework for improving the understanding of how wineries perceived the impact of an exogenous shock on their business, how they reacted, and to highlight that both perceptions and reactions might vary among wine-producing countries, depending on the dominant business model and, particularly, the different market distribution systems.

As mentioned previously, the distribution system adopted by wineries to reach the market determines the level of vertical integration. This is also due to winery size, which is strongly correlated to geographic origin (i.e., Old World vs. New World). Vertical integration is the main factor that distinguishes business models (Alonso Ugaglia et al., 2019). In a nutshell, there are two main integration regimes: upstream and downstream. As can be seen in Figure 1, upstream integration characterizes the Old World, namely France, Italy, and Spain. In these countries, viticulture and viniculture activities are generally integrated, but the sale of wine is entrusted to intermediaries,

¹On the basis of the communications from the European Commission of April 3, 2020 and May 8, 2020 published respectively in the Official Journal of the European Union C 112 I of April 4, 2020 and in the Official Journal of the European Union C 164 of 13.5.2020.

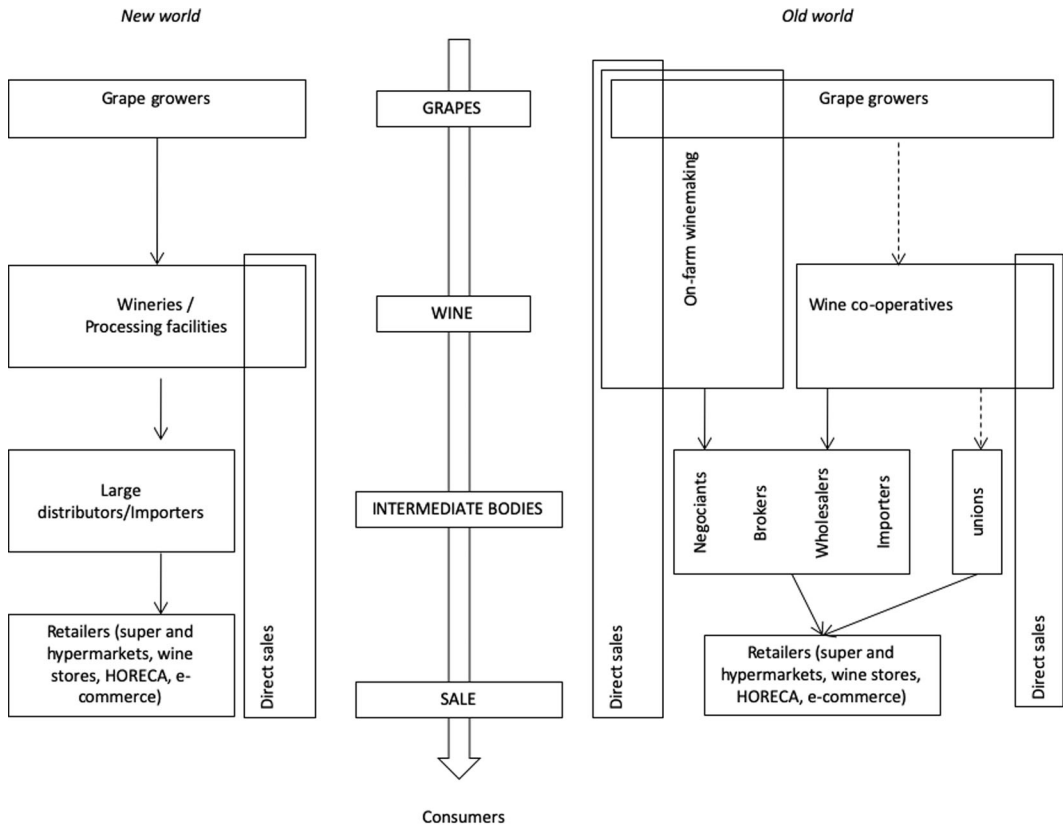


FIGURE 1 Business models in the New World and Old World.

except when the production is sold directly to large retailers that don't want other intermediaries and where the margins on sales prices do not allow for external commissions (Alonso Ugaglia et al., 2019). This is somewhat less true of other European countries where wine trading is less developed and sales activity more pronounced. With an upstream integration model, therefore, wineries risk being cut off from the direct relationship with distributors and consumers because they do not sell (or only partially sell) the wine themselves.

Wineries not involved in the final destination market are, therefore, further from the final consumer. This can have a strong impact on their perception of market developments as they tend to remain focused on the product rather than on consumer expectations. Conversely, in a downstream integration scheme, the company buys grapes from a winegrower and specializes in the production and sale of wine. These companies focus on the customer rather than the product itself, being acutely aware of consumer expectations and are often open to direct-to-consumer (DTC) sales at the winery within the framework of wine tourism activities. This downstream integration model is more characteristic of the New World (South Africa, United States, Chile, Argentina, Australia, New Zealand), although attention to wine tourism is growing in some Old World countries (Alonso Ugaglia et al., 2019; Compés & Szolnoki, 2021).

We assume that this distance from the final consumer, linked to the business model, is a key element in the perceptions and reactions of wineries to the shocks that can affect the sector.^{2,3}

²The term HORECA in Figure 1 is Dutch and can be translated to "on-premise".

³This assumption may be too strong and needs further clarification. The average size (in hectares) of the sample of companies analyzed shows that most of them have to work with large retailers as the on-premise channel cannot absorb such large quantities of wine.

The COVID-19 pandemic is a negative shock of unprecedented magnitude on demand. Even during the lockdown period, large retailers absorbed a good part of the demand (despite it causing a downward tension in sales prices) (Rebello et al., 2021). The general economic crisis, however, calls into question the entire wine supply chain and a significant portion of the traditional wine distribution channels. Depending on their business models, it should, therefore, affect wineries in different ways. We study this issue by surveying wineries in 10 Old and New World countries between September and November 2020. The choice of this period for the survey may have influenced the results. In many countries, such as Italy, this time period recorded a reopening of both on- and off-premise sales channels and a re-opening of local tourism at wineries, even if at reduced visitor numbers due to COVID-19 restrictions (Casangiu.). This survey allows us to analyze differences between wineries, by geographical origin, in their perceptions and reactions to the COVID-19 crisis, while controlling for further characteristics (type of wine, certifications, price segment, etc.).

Our study, therefore, allows us to address the following research question: Are there differences in wineries' perceptions and reactions to the COVID-19 crisis depending on their country of origin? In other words, does the business model influence their perceptions and reactions? In particular, do wineries invest in the same way to mitigate this crisis depending on their geographical location? This last point is particularly interesting from the perspective of a convergence in the business models of the Old and New Worlds. Indeed, one of the most important issues of this crisis is to reveal the limits of a business model that separates the producer from the final consumer when many traditional distribution channels are cut.

These points are of crucial importance for the stakeholders in the sector and raise broader questions about industrial organization at the level of the industry stakeholders as well as the public authorities, which are very involved in this sector, particularly in the Old World.

The following section presents the survey and the main descriptive statistics that emerged from it in terms of perception and reaction to the COVID-19 crisis. The third section presents the results of mean tests, and linear and logistic regressions that identify significantly different perceptions and reactions between the countries studied. The final section offers conclusions.

2 | DATA AND STATISTICAL ANALYSIS

2.1 | Sample characteristics

The survey was conducted in nine countries between September and November 2020. Six of these nine countries are in Europe (Spain, France, Portugal, Italy,⁴ Germany, and Austria). Among them are the three major Old World wine-producing countries (Italy, France, and Spain) which, according to OIV (International Organisation of Vine and Wine) statistics, represent 50% of world wine production (OIV, 2021). The other three countries in the sample, the United States (US), South Africa, and Chile, belong to the "New World." In the present study, under the assumption that differences in business models exist between some countries (Alonso Ugaglia et al., 2019), we isolate three groups of three countries each: the historical Old World (Italy, France, Spain), the "emerging"⁵ Old World (Germany, Austria, Portugal) and the New World (United States, South Africa, Chile).

The questionnaire was administered by email to winery owners/managers, using available listings or with the assistance of professional/industry associations in each country, including Vinitech in France, the regional wine commissions in Portugal, the Consortium of Wine Producers in Italy, the National Society of Winemakers in

⁴Data were collected only from wineries in the Trentino-Alto Adige (Südtirol) region of northern Italy.

⁵To speak of an "emerging Old World" sounds like an oxymoron. It is simply a matter of distinguishing the leading countries in Europe from those whose production is lower but whose exports are increasing.

TABLE 1 Distribution of size (in ha) by “World” with and without cooperatives.

With cooperatives	Mean	Std. dev.	Min	Max
New World	297.83	503.95	1	2,400
Old World historic	161.83	1058.42	0.5	14,000
Old World emerging	66.34	168.93	1	1,200
Without cooperatives	Mean	Std. dev.	Min	Max
New World	278.78	468.72	1	2,400
Old World historic	59.38	188.98	0.5	2,260
Old World emerging	58.56	143.01	1	1,100

Chile, and Wines of South Africa and Vinpro in South Africa. In the United States, emails were sent to all bonded wineries by the American Association of Wine Economists, while in Germany and Austria, all wine producers listed in the Gault Millau Wine Guide and the Falstaff wine guide respectively were contacted. In Spain, the survey was sent to all producers whose economic activity is listed as “winemaking” by the Spanish National Registry of Economic Activities. In all countries, a reminder was sent no more than once. Ultimately, the final sample comprised 542 valid answers out of 22408 emails sent, which amounts to a rate of response of 2.42% of the industry sector. The wineries from the first two groups (historical Old World and emerging Old World) each represent a little more than 40% of the total respondents. The New World group represents around 20% of the responding wineries. As the wine sector is more concentrated in the New World, with fewer but larger wineries in comparison to the Old World, where companies tend to be smaller but more numerous in total (Cusmano et al., 2010), the difference in the numbers of respondents is logical.

The average size of the responding wineries' vineyards exceeds 140 hectares. This size differs markedly between the Old World (112 hectares on average) and the New World (298 hectares on average), consistent with the relative concentration of wineries in these regions (see Table 1). This difference in farm size between the New and Old Worlds is a well-documented characteristic, with size being strongly correlated with the geographic region and hence the business model applied (Alonso Ugaglia et al., 2019). Unfortunately, it is difficult in our sample to directly address the question of the role of firm size. Indeed, the presence of cooperative wineries in the Old World, which aggregate the production of hundreds of small producers and are, therefore, by nature very large, may bias the results (see Table 1). In any event, it would be redundant to include both size and geographic region (i.e., Old World vs. New World) in the same equation, given the strong correlation between these two variables.

Table 2 provides additional characteristics of the wineries comprising the sample.⁶ Fewer than 10% of the wineries in the sample operate within the framework of a cooperative.⁷ About three-quarters of the wineries do not have an environmental certification of any kind. They produce mainly red and white wines, but many also offer rosé and sparkling wines. Almost all the wineries produce bottled wines, but nearly a third also produce bulk wine. The distribution by range appears to be balanced between the three main price segments. Similarly, there is a balance between varietal and blended wines.

In addition to the characteristics of the wineries, the questionnaire was concerned with the consequences of the COVID-19 crisis on business.

⁶An additional descriptive table of the sample variables can be found in Supporting Information: Table A1.

⁷This percentage of the sample underestimates the incidence of cooperatives that represent an important part of the European wine production system.

TABLE 2 Main winery characteristics in the sample.

Variable name	%	Variable coding
<i>Legal status</i>		
Private	57.3	0 = No, 1 = Yes
Corporate	34.5	0 = No, 1 = Yes
Cooperative	8.2	0 = No, 1 = Yes
<i>Certifications</i>		
No Certificate	73.9	0 = No, 1 = Yes
Organic	25.5	0 = No, 1 = Yes
Vegan	13.3	0 = No, 1 = Yes
Sustainable	9.6	0 = No, 1 = Yes
Biodynamic	4.8	0 = No, 1 = Yes
Fairtrade	3.3	0 = No, 1 = Yes
Natural	0.4	0 = No, 1 = Yes
<i>Type of wine^a</i>		
Red	90.8	0 = No, 1 = Yes
Rosé	67.0	0 = No, 1 = Yes
White	86.9	0 = No, 1 = Yes
Sparkling	35.2	0 = No, 1 = Yes
Dessert	20.3	0 = No, 1 = Yes
Fortified	14.4	0 = No, 1 = Yes
Varietal	51.7	0 = No, 1 = Yes
Cuvée	47.8	0 = No, 1 = Yes
Bottled	95.9	0 = No, 1 = Yes
Bulk	31.2	0 = No, 1 = Yes
<i>Price segment^{t,a}</i>		
Premium	43.1	0 = No, 1 = Yes
Value	44.3	0 = No, 1 = Yes
Popular	34.6	0 = No, 1 = Yes
Other characteristics	Mean	Variable coding
Years of operation	54.97	Continuous (1–892)
ha	141.94	Continuous (0.5–3500)

^aPercent does not add up to 100% as producers could give several answers.

2.2 | Statistics on perceptions, reactions, and future challenges

Three main series of questions were asked. The first was related to the perception of the impact of the COVID-19 crisis on various economic aspects that are essential to wineries. The second related to reactions to the crisis, particularly in terms of investment or disinvestment. The third asked about the

challenges that wineries believe they will face in the future. A statistical analysis of these three main sets of questions follows.

2.2.1 | Perceptions

Wineries were asked about their perception of the COVID-19 crisis in six key areas. They were asked to score the impact they felt on a scale of 0–5. Figure 2 shows these scores by country.

The first chart in Figure 2 (top left) gives the impact score for the overall economic health of wineries. The average score for all countries is 3.63. Spain is the country where wineries have felt the crisis the most. There may be a link between the average score per country and the intensity of the health crisis as measured by the number of deaths per million inhabitants (John Hopkins University, 2020) or the drastic nature of the measures taken by public authorities. Thus, among the countries in our sample, Germany, Austria, and South Africa are the countries with the lowest death rates. Their impact scores are also the lowest of the sample. Conversely, the United States, Spain, Portugal, and Italy are among those with the highest death rates. Moreover, while the number of deaths per million inhabitants is relatively low in South Africa, the measures related to alcohol consumption have been particularly severe (including a ban on the sale of alcohol in the country for a period of time, although not the period during which our survey was conducted) (Matzopoulos et al., 2020).

In fact, when examining the impact scores for domestic market access, South Africa, unsurprisingly, has the highest score. Spain, where domestic wine sales are largely made through cafés, hotels, and restaurants (Albisu et al., 2019), has the second highest score, as the on-premise distribution channel has been largely closed during the pandemic. The average impact score across all countries for access to the domestic market is 3.18.

For access to foreign markets, the average score is 3.58. This high score is unsurprising given the paralysis of international logistics in the early weeks of the pandemic during the spring of 2020. Even if logistics were not the main reason for the paralysis, many of the traditional sales channels, such as restaurants and wine bars, were in the lockdown, and therefore, importers/distributors had unsold inventory, especially in the case of high-priced quality wines and appellations. High export volume countries, such as Spain (the world's largest exporter by volume in recent years according to OIV statistics [OIV, 2021]) in particular, have therefore felt the impact of the health crisis on their exports most acutely. Tests of equality of means between the three groups of countries (independent *t*-test with unequal variances) show that the two Old World groups have felt the impact on access to foreign markets significantly more severely than the New World group (see Table 3).

However, but again not surprisingly, it is the impact on tourism that has been felt most heavily, with an average score of 4.16. The lockdowns imposed in most of the surveyed countries did not permit wine tourism activities to continue. Tests of equality of means between the three groups of countries (independent *t*-test with unequal variances) show that this impact was felt significantly more strongly in the New World group than in the two Old World groups. Among the latter two groups, the impact was felt most acutely in the historical Old World group, with a statistically significant difference (see Table 3).

Two additional impacts of the crisis were felt less severely by wineries. These were the impact on costs (mean score of 2.55) and on worker availability (mean score of 2.37). This latter result is more surprising because in some countries (such as France) the health situation did not allow for the admission (at least at the beginning of the pandemic) of seasonal foreign vineyard workers who usually arrive in the spring (International Labor Organization, 2020; Péroud, 2020). It is also true that by the start of the harvest period in late summer 2020, many European countries had partially re-opened their borders to foreign workers, being the reason for the results showing a reduced impact (see Figure 2).

Regarding costs, tests of equality of means (independent *t*-test, equal variances) between the three groups of countries show that the New World countries have felt the impact significantly more severely than the two groups

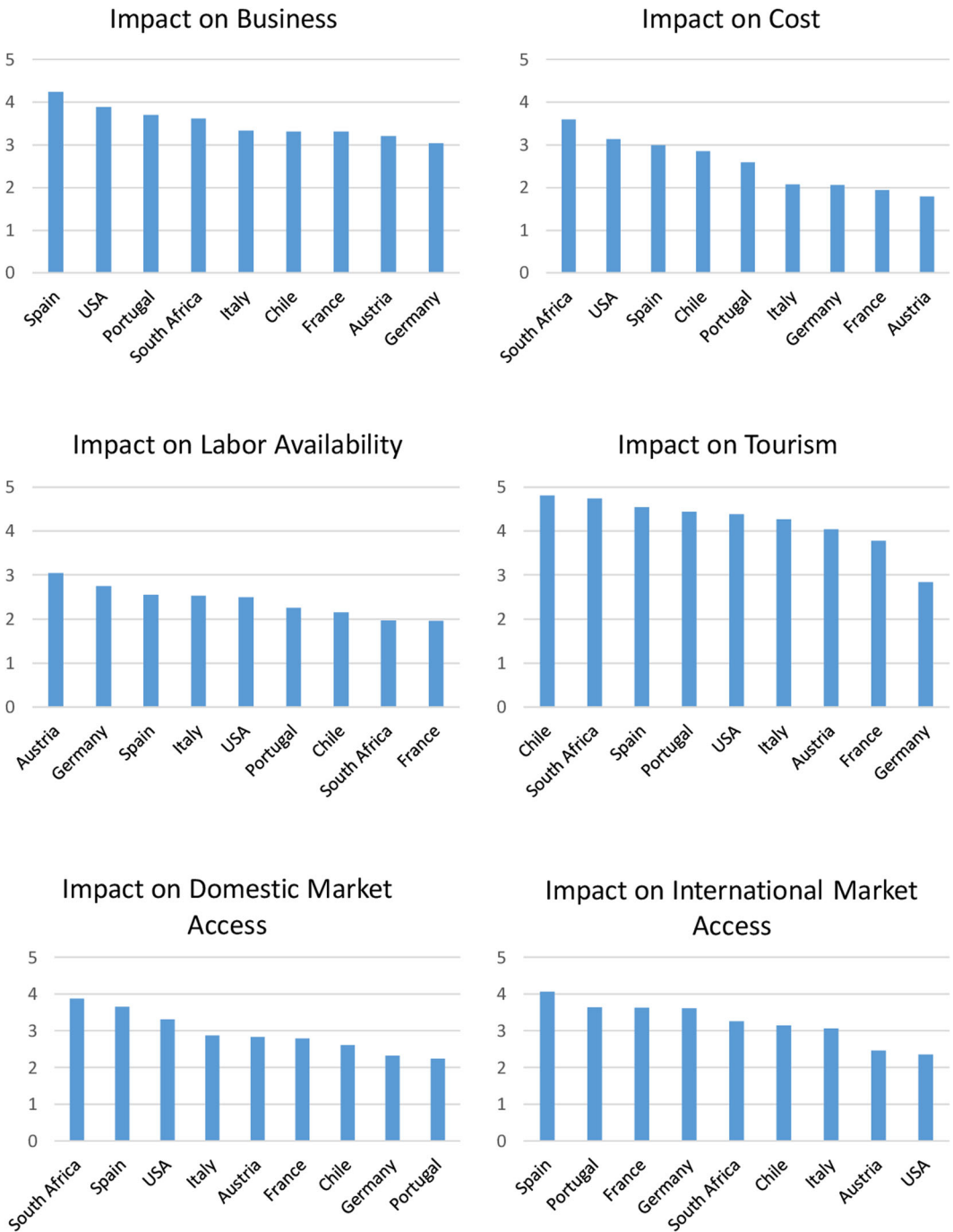


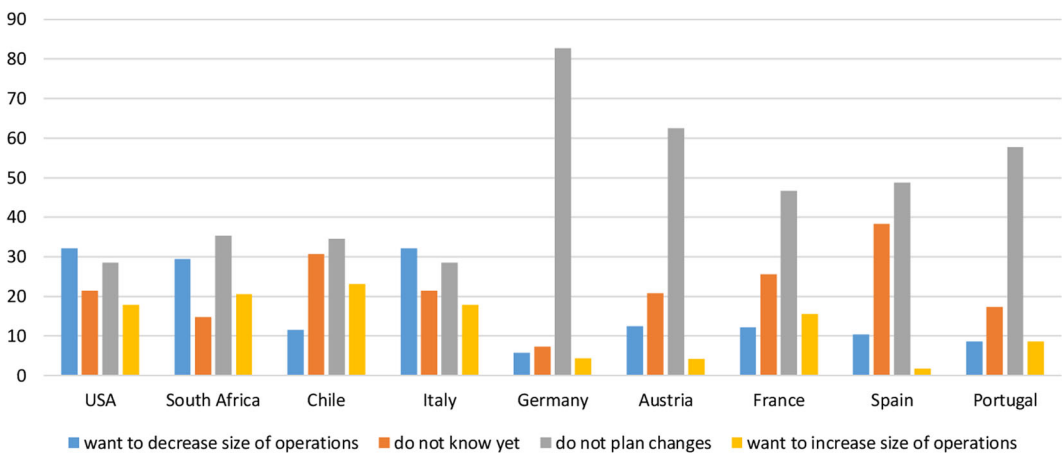
FIGURE 2 Perceptions of COVID-19 impact (0—very low to 5—very high).

of Old World countries (see Table 3). At least two hypotheses can explain this greater sensitivity to costs: logistics costs and positioning in terms of price range. New World wines are located mainly in the entry-level and mid-range price segments and have built their reputation on the quality-price ratio. A majority of their production is exported (with the exception of the United States, but more than 80% for Chile, for example). The increase in supply costs

TABLE 3 Impact on access to foreign markets, tourism, and costs (test results: equality of means)^a

Perceptions	Difference	p-value	Variance
<i>Impact on access to foreign markets</i>			
Old World historic > New World	0.856	$p < 0.001$	Unequal
Old World emerging > New World	0.674	$p < 0.01$	Unequal
<i>Impact on tourism</i>			
New World > Old World historic	0.426	$p < 0.01$	Unequal
New World > Old World emerging	0.726	$p < 0.001$	Unequal
Old World historic > Old World emerging	0.300	$p < 0.05$	Unequal
<i>Impact on costs</i>			
New World > Old World historic	0.732	$p < 0.001$	Equal
New World > Old World emerging	0.877	$p < 0.001$	Equal

^aFor full test results, see Supporting Information: Tables A2–A8.

**FIGURE 3** Types of reaction to COVID-19 (%).

(due to shortages, transport problems, etc.) and the rise in transportation costs impacting export prices have led to a fear of a drop in price competitiveness for wineries in these countries. Spain is in a similar situation (see Figure 2), with inexpensive wines and, therefore, a greater sensitivity to cost variations that can affect its price positioning.

2.2.2 | Reactions

The analysis of the reactions was done in two steps. First, we asked a general question about the type of reaction envisaged by the winery. Would they react offensively by increasing the size of their operations, or defensively by reducing the size of their operations? In other words, the idea is to ascertain whether the winery was considering investing or, on the contrary, disinvesting in response to the crisis. Figure 3 shows the frequency of responses to this question.

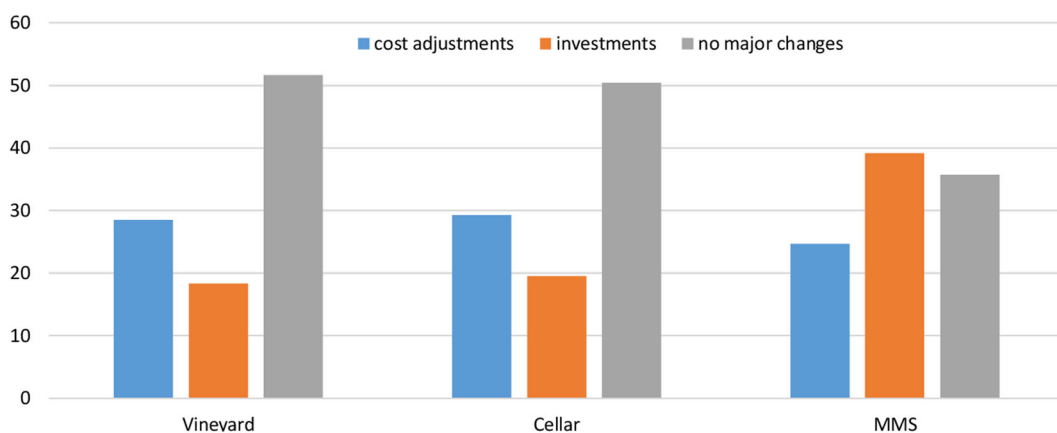


FIGURE 4 Reactions in the vineyard, cellar, and management/marketing/sales (MMS)—in percentage.

A first result seems to emerge according to the country groups. The countries of the Old World appear to take a “wait-and-see” stance when compared to the New World countries, which are more reactive. With the exception of Italy, all the Old World countries state that they are either not considering changing their plans or are undecided. One reason for the reduced reaction in changing investment plans in the Old World countries may be due to investments being partially funded through Common Market Organisation (CMO) measures in the European Union (EU) budget, as this planning has to be done at least a year in advance (i.e., before the onset of the pandemic). By contrast, about 20% of the United States, South African, and Chilean wineries say they plan to invest to increase the size of their operations and about 30% want to decrease the size of operations (and the same percentages are found in Italy, compared to an average of or less than 10% in the other Old World countries).

In a second step, the questions asked to wineries concerned the three main links in the value chain of the wine industry: viticulture (the vineyard), winemaking (the cellar), and sales (including sales support functions such as management, communications, and marketing). For these three links, Figure 4 reveals the desire to invest or reduce costs. As far as vineyard and winemaking activities are concerned, half of the wineries do not wish to make any major changes, while the proportion of those who want to reduce costs exceeds the proportion of those who plan to invest by more than 10% points on average. On the other hand, for the downstream part of the business (i.e., sales) the picture is reversed. Wineries show a much greater willingness to invest than to cut costs.

Figure 4 would, thus, give the image of a concentration of investments from upstream of the value chain towards downstream. Such a movement would be logical insofar as the problem raised by the health crisis is a problem of access to the final customer, and not a production problem. Sales (and the support functions that go with it) are the main challenge raised by the pandemic situation. This confirms, once again, that the business model, and especially the weakness of the different distribution channel systems, is the main area that has been affected by the economic and health crises.

For each of the three main links in the value chain and for each country, we have detailed the types of investment planned. However, for the sake of brevity and clarity, in Figure 5, we show only the results for management/marketing/sales (MMS) investments since this is where the willingness to invest is most pronounced.

Two highlights emerge from this graph. First, the main investments considered are in DTC sales and communication. These two items largely dominate the others. With the same logic of selling directly to the final consumer, investments in the reception of tourists are also high on the list. Then, differences appear by country, with France and Spain lower in willingness to invest in DTC sales and communication. The tests of equality of

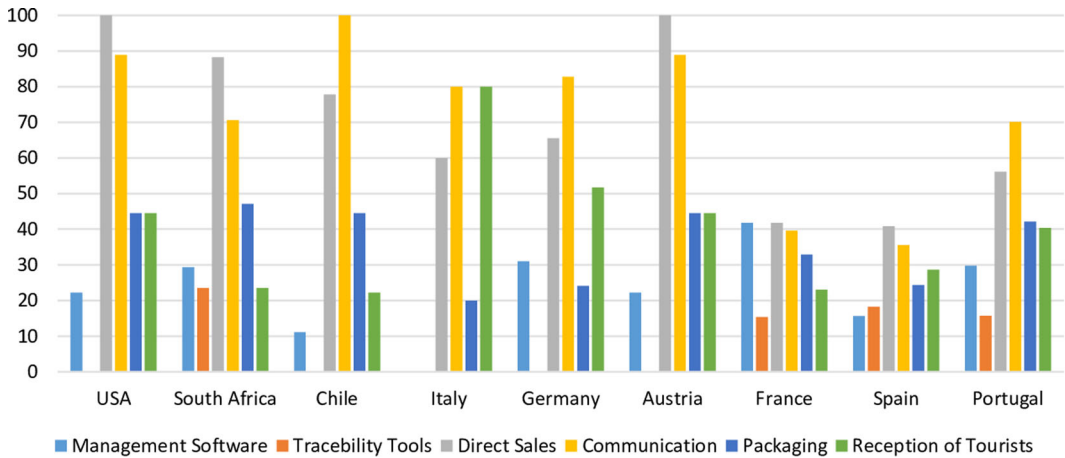


FIGURE 5 Kinds of investment in management/marketing/sales (%).

TABLE 4 Willingness to invest in DTC sales and communication (test results: equality of means)^a

Reactions	Difference	p-value	Variance
<i>Willingness to invest in DTC sales</i>			
New World > Old World historic	0.204	$p < 0.01$	Equal
New World > Old World emerging	0.083	$p = 0.18$	Equal
Old World emerging > Old World historic	0.121	$p < 0.01$	Equal
<i>Willingness to invest in communication</i>			
New World > Old World historic	0.140	$p < 0.05$	Equal
New World > Old World emerging	0.039	$p = 0.53$	Equal
Old World emerging > Old World historic	0.101	$p < 0.05$	Equal

Abbreviation: DTC, direct-to-consumer.

^aFor full test results see Supporting Information: Tables A9–A14.

means between the three groups of countries reveal that the New World shows a significantly more pronounced willingness to invest in DTC sales and communication than either of the two Old World groups. Among the latter groups, tests of equality of means show that the emerging Old World would like to invest significantly more in DTC sales and communication than the historic Old World. Full results are provided in Table 4.

Although it may seem to be an overly simplistic and somewhat Manichean conclusion, it appears that the Old World, in general, and the historic Old World, in particular, would be less inclined to want to reach the final consumer directly following this crisis. This could be explained by a business model that is culturally distant from consumers. In these countries, wineries generally sell wholesale to intermediaries and foreign importers and do not place as much importance on the final customer compared to the United States, for example, where the business model has always been more customer-oriented (Alonso Ugaglia et al., 2019). In this sense, the data depicted in Figure 4 are consistent with our earlier expressed assumption that the distance from the final consumer, linked to the business model, may partly influence reactions to health crises. This leads to the question of whether such differences between countries are also found when the question of future challenges is asked.

2.2.3 | Future challenges

To add a forward-looking dimension to this study, we asked the wineries what the main challenges to developing their activities in the future would be. Figure 6 shows that of the 11 items proposed, four have a relatively low frequency of response. Vine diseases, competition from other beverages, funding requirements, and diversification of activities receive a less than 50% response frequency in each country. These four challenges, therefore, appear to be of lesser importance. Regarding the fear of competition from other beverages, it should be noted that the United States has a higher response rate than the other countries. This may be justified by the highly competitive nature of the US market, where substitution effects between alcoholic beverages are already prevalent (Anderson et al., 2018), as shown by the long-standing phenomenon of craft beers and the more recent phenomenon of hard seltzer.

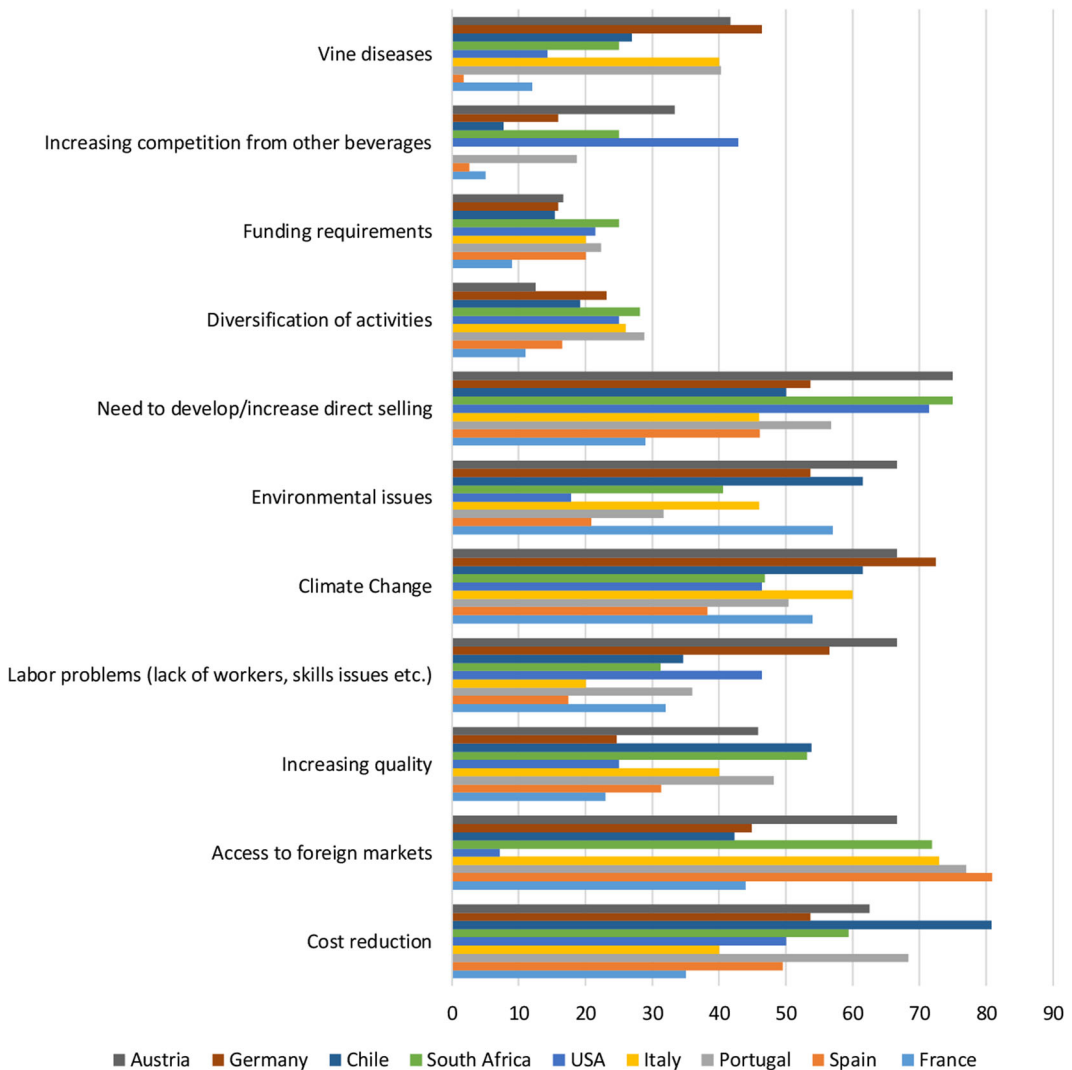


FIGURE 6 Main future challenges (%).

Conversely, two items stand out in importance by frequency of responses: the need to sell directly to the consumer and access to foreign markets. These two challenges correspond to the concerns identified in the context of the consequences of the COVID-19 crisis. There is, therefore, consistency in the responses. Access to foreign markets is seen as a major challenge in countries that depend heavily on their exports (Spain, Portugal, Italy, South Africa). Although France is one of the world's largest wine exporters, the French market remains one of the largest wine consumer markets in the world, along with the United States and China. For the United States, access to foreign markets is a marginal issue because, on average, American wineries sell most of their production within the domestic market. American wine is often expensive and is targeted mainly at American customers (Lapsley et al., 2019). As far as DTC sales are concerned, this is not perceived as a major issue by French wineries, nor, in general, by wineries in the historic Old World. However, this issue appears to be very important for the emerging Old World and, even more so, for the New World. Here we find cultural and business model differences between the three groups of countries that could justify such differences in responses.

The next most important challenges are environmental issues and climate change. Focusing on France and Germany, these two items are the ones that receive the highest frequency of response among the 11 proposed. The main challenge for French and German wineries is climate and environment. With the exception of Chile, the other countries appear to be less concerned about these issues, although climate change remains, on average, an important item in the eyes of all the wineries. Tests of equality of means between the three groups of countries show that the emerging Old World considers climate change to be a significantly more important issue than the other groups of countries. This might be linked to the fact that in some countries of the "emerging Old World"—such as Germany and Austria—environmental concerns are more widespread.

Issues related to the availability and qualification of labor, wine quality, and cost reduction receive a slightly lower response frequency than the previous four issues. Nevertheless, for some countries, they appear to be central. Thus, the main challenge for Chile in the future will be to reduce costs. This is also a very important issue for Portugal. These two countries, already very competitive in the world market, are fully aware that they must consolidate their current competitive advantage in terms of costs. For the German-speaking countries and the United States, the issue of access to labor is also very important.

To complete our descriptive statistical analysis, we performed logistic regressions to incorporate the characteristics of the wineries and to check whether the results by country group are robust when these characteristics are considered.

3 | REGRESSION ANALYSIS

In this section, we seek to verify whether belonging to a country group plays a significant role in the perception of the impact of COVID-19 and in the reactions of wineries when all their characteristics are considered. We perform two sets of regressions. The first deals with wineries' perceptions and the second with wineries' reactions.

3.1 | Perceptions

Two models are presented. Model (1) considers only the characteristics of the wineries. Model (2) adds belonging to one of the three groups of countries. The comparison of the two models will allow the identification of the role of the business model (i.e., belonging to one of the three groups of countries) and the robustness of the analysis.

$$y = \alpha + C_fixed_effect + \beta.Characteristics_i + \epsilon_i \quad (1)$$

$$y = \alpha + C_fixed_effect + \beta \cdot Characteristics_i + \gamma \cdot World_Group + \varepsilon \quad (2)$$

y is the perceived impact of COVID-19 on the different areas of activity of the winery (as presented in Figure 1). C_fixed_effect is a country fixed effect to control for unobserved country-specific impacts. $Characteristics$ is a set of winery-specific control variables and $World Group$ is a set of characteristics related to the country groups (Old World historic, Old World emerging, New World), ε is the error term. Considering the way in which the questions about the impact of COVID-19 were asked, y can be considered a continuous variable.⁸ Therefore linear regression (OLS) can be used for estimating Equations (1) and (2). The regression results for Models (1) and (2) are presented in Table 5.

Table 5 shows that winery characteristics play a limited role in wineries' perception of the impact of COVID-19. The comparison between Model (1) and Model (2) in Table 5 shows the stability of the results concerning the weight of winery characteristics on the perception of the impact of COVID-19. Focusing on the overall results of Table 5, the impact on costs felt by wineries for both domestic and international markets becomes less the more they produce varietal wine. Furthermore, not having environmental certifications is associated with a weaker impact felt on the domestic market, while producing red wine is associated with a stronger impact felt on both domestic and international markets.

These results are in line with recent literature. Based on a broad review of the literature, Maesano et al. (2021) reveal the growing interest of consumers in wines with environmental certification. In a market where wine consumption has declined (OIV, 2021), especially for large retail distribution channels, this type of certification could dampen the decline. Similarly, the popularity of white, rosé, and sparkling wines (excluding Champagne) at the expense of red wine, would also have limited the decrease in sales for producers of these wines in 2020 (also according to OIV, 2021 figures). Conversely, producing red wine would increase exposure to a decrease in sales. This could explain the higher perceived impact for red wine producers. The role of varietal wine production is more difficult to interpret, with the impact on access to foreign markets and costs felt less strongly. The difficulty of interpretation stems from the fact that from one wine region to another, varietal wine represents either a symbol of quality (Pinot Noir from Burgundy, Cabernet Sauvignon from Napa Valley, or Riesling from Mosel, for example), or an entry-level wine belonging to the first step of the quality pyramid, such as Protected Geographical Indication (PGI) wines in Europe. Finally, bulk producers are less affected by the crisis. This is probably because they are not in contact with the final consumer as are those who sell their bottled wines directly to the distribution channels affected by the various lockdown and social-distancing restrictions. Basic (i.e., entry-level) wines are the ones that sold best during the lockdowns, especially in Europe (Dubois et al., 2021). They tend to be sold mainly in supermarkets, where bag-in-box sales have taken an important market share. These basic wines are generally varietal wines, which could explain why the producers of these wines have felt the crisis less than others.

Focusing on the results of Equation (2) of Table 5 allows us to consider the three country groups in addition to the winery characteristics. The New World group is used as a reference. The coefficients of the other groups must therefore be interpreted relative to the New World group. Thus, it can be seen that the historical and emerging Old World countries have significantly different perceptions of the impact of COVID-19 on the different areas of activity than the New World countries. There are also nuances among the Old World groups. Before commenting in more detail, these results already seem to validate the importance of differences in origin (i.e., country group) and then, by hypothesis, in business models in the perception of COVID-19 impacts by wineries, even when the winery characteristics are taken into account.

⁸Data obtained from Likert Scales can be interpreted as metric (used as quasi-metric) variables if only "end points" are labeled which are the exact opposite of each other (with 0 indicating the lowest expression). The naming of categories, on the other hand, would take away the element of intuitively selecting an answer within a standardized array of equally distant choices (Carifio & Perla, 2007; Nardi, 2003; Urban & Mayerl, 2011; Völkl & Korb, 2018). Our variable was coded from 0 (no impact) to 5 (severe impact) and fulfills the respective requirements.

TABLE 5 Perceptions of COVID-19 impact by winery characteristics (Model 1) and country groups (Model 2) (OLS estimation).

Impact on	Industry		Costs		Domestic market		Intern. market		Tourism	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Sparkling	0.042 (0.101)	0.042 (0.124)	0.219 (0.152)	0.219* (0.057)	0.062 (0.146)	0.062 (0.108)	0.015 (0.160)	0.015 (0.047)	0.149 (0.121)	0.149 (0.137)
Varietal	-0.169 (0.105)	-0.169 (0.193)	-0.284* (0.161)	-0.284** (0.062)	-0.311* (0.166)	-0.311*** (0.030)	-0.535*** (0.172)	-0.535* (0.181)	-0.070 (0.132)	-0.070 (0.036)
Premium	0.015 (0.100)	0.015 (0.121)	-0.112 (0.158)	-0.112 (0.254)	-0.149 (0.146)	-0.149 (0.152)	-0.043 (0.169)	-0.043 (0.282)	-0.091 (0.137)	-0.091 (0.079)
Red	-0.032 (0.182)	-0.032 (0.098)	-0.140 (0.241)	-0.140 (0.229)	0.303 (0.254)	0.303* (0.086)	0.348 (0.262)	0.348* (0.090)	0.347 (0.248)	0.347 (0.195)
No certification	-0.051 (0.117)	-0.051 (0.049)	-0.210 (0.165)	-0.210 (0.228)	-0.392** (0.167)	-0.392** (0.077)	-0.025 (0.157)	-0.025 (0.270)	0.026 (0.142)	0.026 (0.062)
Private	0.219** (0.102)	0.219 (0.216)	0.061 (0.148)	0.061 (0.178)	0.270* (0.159)	0.270 (0.232)	-0.007 (0.161)	-0.007 (0.388)	0.087 (0.136)	0.087 (0.091)
Years of operation	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.001** (0.000)	0.002*** (0.001)	0.002** (0.000)	0.001* (0.001)	0.001 (0.000)	0.001** (0.001)	0.001 (0.000)
Bulk	0.026 (0.101)	0.026 (0.088)	-0.029 (0.147)	-0.029 (0.057)	0.197 (0.150)	0.197 (0.212)	0.134 (0.148)	0.134 (0.262)	0.015 (0.126)	0.015 (0.053)
Old World historic	-	-0.362 (0.132)	-	-1.149*** (0.095)	-	-0.418** (0.096)	-	0 (0.159)	-	-0.217* (0.057)
Old World emerging	-	-0.650* (0.206)	-	-1.525*** (0.078)	-	-0.650*** (0.004)	-	1.226*** (0.124)	-	-0.440** (0.059)

TABLE 5 (Continued)

Impact on	Industry		Costs		Domestic market		Intern. market		Tourism	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	4.066*** (0.292)	4.066*** (0.374)	3.639*** (0.414)	3.639** (0.543)	3.453*** (0.473)	3.453*** (0.261)	2.354*** (0.576)	2.354*** (0.321)	4.027*** (0.420)	4.027*** (0.289)
R-squared	0.3818	0.3818	0.1314	0.1314	0.1456	0.1456	0.100	0.100	0.2107	0.2107
N	530	530	531	531	528	528	523	523	529	529

Note: Standard deviations are in brackets. New World as a reference. Estimations with (cluster)robust standard errors and country fixed effects.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Regarding the overall impact, both Old World groups (i.e., historical and emerging) feel the impact of COVID-19 less harshly than the New World. There is only one exception, being the impact felt on international market access, which is stronger for both Old World groups. These differences reveal the specificities of the business models. In particular, given the importance of export markets for the turnover of Old World wineries, it seems logical to note that the impact felt in this area is significantly greater than that felt by New World wineries. The opposite is true for tourism, which is more central to the business model of New World wineries than Old World wineries, due, in particular, to the average difference in winery size between the two worlds (Festa et al., 2020). It is also true, as previously mentioned, that the survey analyzes a sample that underestimates the medium and small wineries of the Old World and which could, therefore, have affected some answers.

3.2 | Reactions

As in the previous case, two models are proposed to study wineries' reactions to the COVID-19 crisis. The first (Equation 3) represents the basic model, in which only the characteristics of the wineries are considered. In the second model (Equation 4) we add the three groups of countries.

$$\text{prob}(y) = \alpha + C_fixed_effect + \beta \cdot \text{Characteristics}_i + \varepsilon_i \quad (3)$$

$$\text{prob}(y) = \alpha + C_fixed_effect + \beta \cdot \text{Characteristics}_i + \gamma \cdot \text{World_Group} + \varepsilon_i \quad (4)$$

This time y represents the likelihood to engage in an investment strategy, such as the investment strategies mentioned in Figure 4. *Characteristics* is a set of winery-specific control variables. *C_fixed_effect* is a country fixed effect to control for unobserved country-specific impacts and *World_Group* is a set of characteristics related to the country groups (Old World historic, Old World emerging, New World). ε is the error term. The likelihood to invest in a field of activity (y) is a binary variable taking the value 1 when the winery wants to invest and 0 otherwise. The estimation is therefore done with a binomial logistic regression.

The results, presented in Table 6, relate only to investments in DTC and communication. The descriptive statistics presented in the previous section indicated a general likelihood to invest in these areas of activity. More precisely, we identified a desire to disinvest in the upstream part of the value chain (in the vineyard and in the winery) to concentrate investments in the downstream part (sales). However, this general movement was accompanied by geographical differences between groups of countries. The purpose of Models (3) and (4) is to determine whether these differences are statistically significant, including when controlling for firm characteristics. The business models of the groups of countries, more or less oriented toward the final consumer, may indeed suggest that there are significant differences in the investment strategies of the wineries in the downstream part of the value chain, particularly in sales.

As with the perceptions of impact (Table 5), Table 6 reveals the importance of the geographical origin of countries and, therefore, of the business models, in explaining wineries' likelihood to invest in DTC sales and communication. With the New World as a reference, it appears that the Old World and, more specifically, the historical Old World, show less likelihood to invest in DTC sales and communication, which is also suggested by the t-test results comparing the reactions of the emerging Old World and the historical Old World (see Supporting Information: Tables A11 and A14). This confirms the simplified assertion that the business model, linked to geographical groups of countries, plays a significant role in investment choices. New World wineries, naturally close to the final consumer because of their business model but also more reactive and innovative (Cusmano et al., 2010), appear more prone to sell their wines directly to the final consumer than those of the Old World. They, therefore, show a greater likelihood to invest in DTC sales. Beyond geography, it is history and culture that weigh on the constitution of a common business model (Wongprawmas & Spadoni, 2018) and, consequently, on the strategic choices of wineries in the face of the COVID-19 crisis. These results show that the impact of the pandemic is

TABLE 6 Likelihood to invest by winery characteristics (Model 1) and country groups (Model 2) (logistic estimation).

	DTC sales Model 1	DTC sales Model 2	Communication Model 1	Communication Model 2
Sparkling	0.399* (0.222)	0.399*** (0.072)	0.456** (0.226)	0.456* (0.270)
Varietal	-0.479** (0.229)	-0.479 (0.337)	-0.372 (0.227)	-0.372 (0.413)
Premium	-0.006 (0.220)	-0.006 (0.228)	0.184 (0.227)	0.184 (0.171)
Red	-0.520 (0.322)	-0.520 (0.393)	-0.119 (0.345)	-0.119 (0.255)
No certification	0.111 (0.234)	0.111 (0.138)	-0.042 (0.239)	-0.042 (0.232)
Private	0.158 (0.219)	0.158 (0.110)	-0.242 (0.226)	-0.242 (0.415)
Years of operation	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	0.001*** (0.000)
Bulk	0.125 (0.213)	0.125 (0.276)	0.038 (0.213)	0.038 (0.435)
Old World historic	- -	-1.770*** (0.178)	- -	-1.301*** (0.222)
Old World emerging	- -	-0.762*** (0.096)	- -	-0.766* (0.426)
Constant	0.095 (0.583)	0.857 (0.626)	-0.186 (0.600)	0.581 (0.726)
N	535	535	535	535

Note: Standard deviations are in brackets, New World as base category. Estimations with (cluster)robust standard errors and country-fixed effects.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

asymmetric for wineries. This asymmetry depends not only on the greater orientation towards the foreign market or the type of wine produced but also on the predominant business model. Moreover, this business model also generates an asymmetric response to the crisis depending, above all, on the proximity of the wineries to the final consumers. Company characteristics do not play a statistically significant role in the wineries' choices to invest in communications or DTC sales. The only exception is sparkling wine producers, where the probability to invest is higher. Only wineries producing varietal wine show a lower likelihood to invest in these areas of activity. One interpretation could be that blended wines are sometimes (depending on the wine region) associated with a higher quality level, while the status of varietal wine is more ambiguous. As previously indicated, this may be associated with bulk and entry-level sales in some regions. Therefore, investments in direct sales or communications would not be necessary.

The main implications of these results are twofold. First, these findings show that when an exogenous shock hits a sector, the managerial responses can be different depending on the business model. This implies that policy responses to support a sector should depend on the respective dominant business model. In particular, a single European response, not differentiated by country, may not be optimal. Instead, policy support should be implemented at a national level.

Second, the future investment directions of wineries have important practical implications for upstream and downstream suppliers in the industry. Our results point to a shift of investments from upstream to downstream, that is, from production to marketing and sales. Suppliers should, therefore, adapt their capacities and product portfolio to cope with this new situation. The challenge for suppliers will be to support wineries to optimize their sales, especially focusing on DTC sales (including digital sales) and communication.

4 | CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH

We studied differences in the perceptions and reactions to the COVID-19 crisis of 542 wineries from nine countries, divided into three groups: the New World (United States, South Africa, Chile), the historical Old World (Italy, France, Spain), and the emerging Old World (Portugal, Germany, Austria). Controlling for winery characteristics (type of wine produced, product segment, etc.), we identified statistically significant differences in both the perceived impact of COVID-19 and wineries' responses in terms of planned investments. We interpreted these differences as evidence that dissimilar business models led to different perceptions of exogenous shocks and different strategic responses, with the New World perceiving significantly more severe impacts than the Old World wine-producing countries. The period of the survey could have affected responses regarding the impact on the European countries, even if the crisis, in general, was felt more harshly in 2020 than in 2021.

This result is consistent with the recent literature on business models in the wine sector (Alonso Ugaglia et al., 2019). Although one should not make sweeping generalizations, it would appear that differences in models exist between New World and Old World countries. In the Old World (Europe), it is also worth distinguishing countries with very similar cultures and production sizes (the three major wine-producing countries of Spain, France, and Italy) from other wine-producing countries.

Moreover, our results show a common desire among wineries to direct their future investments towards DTC sales and communications, to the detriment of investments in the upstream part of the value chain (vineyards and cellars). This desire is particularly strong in the New World wineries, as their business model is already oriented towards the downstream part of the value chain and the final consumer. Investments in DTC sales seem relevant in a context where traditional sales channels, notably on-premise (i.e., cafés, hotels, and restaurants), appear to have been weakened by the health crisis. The likelihood of New World wineries to invest more heavily in this type of business probably underlines their greater reactivity to shocks and their greater capacity to innovate, and could eventually justify accelerating their catch-up with the Old World (Cusmano et al., 2010). On the other hand, in Old World countries such as Portugal and Spain, consumers who used specialized wine apps or purchased wine online during the pandemic increased the frequency of wine consumption (Rebelo et al., 2021). European wineries should take this into account as it indicates a progressive inclination of consumers to use new technologies to buy wine or to improve their knowledge about it.









Finally, our results are perfectly in line with surveys conducted on a much larger sample of firms on the same theme at the ProWein trade fair (Mueller Loose & Nelgen, 2020). However, there are inherent limitations to this type of survey that lead us to be cautious about our conclusions. In particular, due to the survey being based on voluntary responses from wineries, the sample does not ensure a perfect representation of all the wineries in the three groups of countries and there may be a self-selection bias in our sample. The largest and, therefore, best-structured firms would have responded more, on average, than the smaller family-owned firms that make up the bulk of the Old World winery population. Future research should, therefore, confirm these results, in particular

by monitoring the performance of the wineries in these groups of countries in the coming years following the COVID-19 shock.

ACKNOWLEDGMENT

Open Access funding enabled and organized by Projekt DEAL.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Niklas, B., Cardebat, J.-M., Back, R. M., Gaeta, D., Pinilla, V., Rebelo, J., Jara-Rojas, R., & Schamel, G. (2022). Wine industry perceptions and reactions to the COVID-19 crisis in the Old and New Worlds: Do business models make a difference? *Agribusiness*, 38, 810–831.

<https://doi.org/10.1002/agr.21748>