Documento de Trabajo 2023-01

Facultad de Economía y Empresa

Universidad de Zaragoza

Depósito Legal Z-1411-2010. ISSN 2171-6668

ONLINE WINE PURCHASING IN SPAIN AND PORTUGAL DURING THE COVID-19 PANDEMIC

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Abstract

This paper assesses the impact of Covid-19 on the online wine purchasing patterns. This extraordinary situation has accelerated the online trend in wine purchasing. An analysis of the behaviour of online wine consumers before and during the pandemic period shows changes in purchasing patterns. Based on a survey carried out for Spain and Portugal, we find differences between the two countries. The results suggest that the online wine purchasing trend prior to the lockdown was been modified by the pandemic situation. It is therefore important to identify whether these changes are still in place and whether they are here to stay.

Keywords: online wine purchases, wine consumer behaviour, wine industry

JEL classification: D12, Q13

Funding: This study has received support from: the VINCI project SOE3/P2/F0917, Wine, Innovation and International Competitiveness. The VINCI project is co-financed by the Interreg Sudoe Program (European Regional Development Fund). Project Crecimiento Económico Sostenible: utilización eficiente de recursos y trabajo seguro. Ministerio de Ciencia de Innovación. Agencia Estatal de Investigación. PID2020-114460GB-C32

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1. Introduction

The Covid-19 pandemic has accelerated the shift towards e-commerce through both its disruption of traditional sales channels and its effect on consumer buying habits (Guthrie, Fosso-Wamba and Arnaud, 2021). Imposed lockdowns, social distancing rules, capacity restrictions, the mandatory use of face masks, and the fear of catching the virus (Plata *et al.*, 2022) have had a devastating impact on the traditional retail property sector.

In an attempt to mitigate these effects while maintaining and enhancing customer relationships, companies have accelerated digitalisation through the use of web-based technologies, such as videoconferencing, CRM and e-commerce (Bettiol *et al.,* 2021). Own and specialised platforms powered by digital technology have had to be adapted quickly, and this is expected to continue to support this change as consumers, producers and retail companies adjust to new normalities (Nanda, Xu and Zhang, 2021).

Wine commerce has been heavily affected by the Covid-19 pandemic, with asymmetric impacts. On the one hand, international trade suffered a sharp fall in value between February 2020 and February 2021, with such a strong recovery that by the spring of that year it had already recovered to its pre-pandemic level (OEMV, 2021). On the other hand, the impact has differed depending on the sales channel (worse on the on-trade/hospitality than off-trade and direct sales), on the price segment (worse for medium to high-priced wines (Gerini, Dominici and Corsini, 2021)), on the types of wine (worse for bottled and

sparkling wines) and on the markets, both export and import. With respect to consumers, the crisis has changed their habits in different ways (Alpers *et al*., 2021), affecting their purchase frequency (Dubois et al., 2021; Rebelo *et al.* 2021) and their spending (Compés *et al.*, 2021). According to Wine Intelligence (Wine Intelligence Global Wine E-commerce 2021 Report), wine e-commerce has become a more mainstream product in many markets, and its user base has expanded from the 10-20% of engaged, discovery-oriented wine drinkers to 40-50% of the population who like wine and buy it regularly[1].

Before the pandemic, e-commerce wine sales were relatively low, although with significant differences between countries (Szolnoki, Thach and Kolb, 2016). During this time, the wine sector was thought to be under-utilising the potential of the internet as part of an integrated marketing strategy (Quinton and Harridge-March, 2003). In 2012, Santos and Ribeiro (2012) considered that the online wine market was a niche in Portugal. In 2016, Bonn *et al*. (2016) believed that the opportunity for consumers to use online sales channels for purchasing wine was at the beginning of its life cycle. In 2019, Italy's e- market wine accounted for just 1% of total retail sales, vs. 4% in the US, 10% in the UK and 29% in China, In Spain OEMV (2021) estimates wine commerce at about 3%.

Several factors have limited the growth of this channel. First, since wine is an experience good, there is a fear associated with online wine purchasing, i.e. the perception of increased risk (the security of personal financial information) by the would-be consumer (Quinton and Harridge-March, 2008). Second, website functionality was rated the most important navigational issue (Bruwer and Wood, 2005). Third, the different motivation of the buyer, mainly because more useful information may be obtained in offline shopping than in online shopping (Kim, Park and Park, 2007).

A lot of variables have a significant effect on food e-commerce attitudes and/or consumption (Wang, Somogyi and Charlebois, 2020). Sociodemographic circumstances affect the profile of the e-commerce buyer. Haight, Quan-Haase and Corbett (2014) found that differences in people's access to the internet and the level of online activity show that societal differences exist concerning income, education, rural/urban residence, immigration status, and age. In the US, Li, Kuo and Rusell (1999) concluded that education, demographics, convenience orientation, experience orientation, channel knowledge, perceived channel distribution utility, shopping orientation and perceived accessibility are robust predictors of the online buying status (frequent online buyer, occasional online buyer, or non-online buyer) of internet users. Age is considered a barrier to accessing the

[1] https://www.wineintelligence.com/wine-e-commerces-huge-opportunity-in-2021/

internet (Sourbati, 2009) and it appears that older consumers are an under-represented segment of internet users (Trocchia and Janda, 2000). However, the 'break-point' is older than normally identified in academic and business practice (Rybaczewska and Sparks, 2021). While it has been found that a person's gender is not a differentiator of activity, marital status is. Stranahan and Kosiel (2007) concluded that in Florida, younger, college-educated, higher-income households, living in suburban and rural and small towns spend and shop the most online.

It seems plausible, therefore, that the profile of the online wine consumer could be different from the offline consumer. It appears that the online segment is mainly composed of young, well-educated and high-income male consumers who buy wine online often less than once a month. They are motivated by convenience, a wider selection of wines, availability and price (Santos and Ribeiro, 2012). According to an Australian study, online wine buyers were mostly well-educated, high-income males in the 35- to 44-year-old age group. The wine was confirmed to be both an information and price-sensitive product in the online retailing context (Bruwer and Wood, 2005). The online wine buyer is an older, married, high-income male and is more likely to be a wine connoisseur (Higgins *et al*., 2015). Castellini and Samoggia (2018) found that some Millennials are shifting toward these new sales channels. The gender of website visitors turns out to be relevant for the prediction of purchasing wine (related) products (Van den Poel, D., and Buckinx, 2005). Another factor that is positively related to online wine buying is social media usage (Sogari *et al.,* 2017; Pucci *et al*. 2019). Interestingly, it has been shown that South African and Italian online wine consumers are more similar to each other than offline wine consumers (Cobelli and Wilkinson, 2020).

Within this context, the main objective of this paper is to analyse the behaviour of online wine consumers from Spain and Portugal before and during the pandemic, an extraordinary and disruptive moment for shopping channels. This may allow us to discover whether there has been a change in buyer behaviour that is likely to have longer-term consequences on the propensity to buy wine online. In addition, the article attempts to determine whether the profile of online wine buyers in Spain and Portugal is similar and, also, the influence of the sociodemographic variables that the literature on this topic has found to be most important. The choice of these two countries was motivated by the fact that they are two cases of traditional wine consumers, with a great cultural and geographical proximity, and also with similar levels of per capita income. The fact that the survey data were available for them was also decisive.

This article is structured as follows. We first explain the conditioning factors of the behaviour of online wine consumers in order to identify their profile (section 2). Section 3

develops the empirical analysis (data and results). Section 4 presents the results and Section 5 ends the study with some conclusions and a discussion.

2. Wine-related lifestyle dimensions in online purchase behaviour

Wine-related lifestyle dimensions are frequently used in the study of consumer behaviour. In this paper, we address the groups of variables to explain how this lifestyle affects online wine purchasing patterns, namely wine consumption habits, the socio-economic characteristics, use of mobile apps and psychological Covid-19 related variables.

2.1. Wine consumption habits

Covid-19 constituted a shock that has affected the consumption behaviour of alcoholic beverages, both in the wine sector and in other substitute products such as beer. Therefore, from an economic point of view, this is an exceptional event for the study of wine consumption during periods of high uncertainty.

At other times there have been relevant events that have modified consumption patterns such as wars, terrorist attacks or natural disasters. However, this is a different case because, given the global scope of the pandemic, it has affected all countries at the same point in time (Dubois et al., 2021).

Although the impact of Covid-19 has not been the same in all countries, there has been a common situation in all of them, and that is the lockdown. This made it impossible to consume wine in places such as restaurants or bars and made it difficult to buy it in the principal channels. Spending much more time at home could facilitate, as in the case of many other goods, its purchase online, a channel that until then had been of little relevance. For this reason, the study of the impact of the lockdown on wine buying habits is particularly significant. Consequently, to fulfill the objectives of this paper, the first research question is:

> *H1: The exceptional circumstances involved in lockdown modified the probality of buying wine online*

2.2. The socio-economic characteristics of consumers

Personal circumstances and lifestyle are important and expected to influence behaviours, including technology usage (Rybaczewska and Sparks, 2021; Zniva and Weitzl, 2016). Several studies provide evidence on the influence of consumers' socio-economic characteristics, such as gender, age or income level, on the intention to shop on the internet,

influencing online shopping behaviour (Al-Maghrabi and Denis, 2011; Bhat, Darzi and Hakim, 2019)

Gender is one of the most widely used variables in the study of wine consumption patterns, as it is the male gender that has the highest consumption rates. Gender segmentation is well-established in the literature. Several studies suggest gender as the first wine market segmentation vector (Ferreira et al; 2019). Furthermore, the Covid crisis has increased gender diversities, reinforcing traditional gender roles (Agnoli and Charters, 2022)

In addition to including the above variables in the marketing segmentation of wine consumers, Barber, Taylor and Strick (2010) include the impact of the area of residence as one of the explanatory factors of wine consumption patterns. They obtain positive results regarding the use of selective marketing to understand the behaviour of wine consumers.

Several studies have stressed that age is negatively correlated with technology apps and their general use, because older people may not lead a digital lifestyle. Cohort effects refer to the difference in attitudes between different age-cohorts due to generational differences in socialisation, life experiences and economic conditions. Fuentes, Vriesekoop and Urbano (2017) consider that the most prominent characteristic of millennials is their technology savviness and the use of that technology in almost every aspect of their lives.

McGarry et al. (2018) relate the different generations to the segmentation of the wine market. Their work shows that the number of bottles purchased increases with the generation. They also show that phone apps are used by 23% of millennials, 26% of generation X and only 12% of baby boomers. Apps appear in fifth place, representing 21% of the sources of information about wine used, far from other sources of information such as search engines or the websites of the wineries themselves.

The Covid-19 crisis has changed buying patterns, with online shopping emerging as a growing channel. The use of wine apps as an online shopping channel allows wineries to identify consumer profiles. Furthermore, and related to psychological variables, Luchetti *et al*. (2020) consider that older people have also suffered less from loneliness, especially during the first phase of the lockdown, compared to younger age groups.

Another determinant related to online consumer behaviour should be the job sector. It is stated that the population's job sector, such as commerce, industry, and services, plays an important role in influencing societies in the adoption of new technologies, which may affect many sectors (Akman and Rehan, 2014). According to Jin, Drozdenko, and Bassett (2007), workers who use Internet services understand the required knowledge, technical skills, and perception of proficiency possessed, which may reveal different patterns compared to other

workers. Therefore, research on online purchasing considering different professionals may contribute to expanding the theoretical debate on business strategies.

In relation to income level, Balenovic *et al*., (2022) estimate that it is the older cohorts who spend more money on wine and with a higher frequency, compared to generations X and Y.

Consequently, the second research question is

> *H2: Individual and household characteristics and circumstances influence the probability of the online buying of wine consumers*

2.3. Mobile apps and their impact on the online wine market

A review of consumer behaviour for wine 2.0 is conducted by Lockshin and Corsi (2012) and although the impact of online sales is considered, the development of apps is not specified. Bauman et al., (2020) examine consumers' use of wine 2.0 when purchasing wine. They fail to analyse the specific use of the different wine 2.0 tools available as information sources and often simply identify the internet as a singular information source. It is essential to correct this flaw in order to understand how consumers use the broad array of wine information sources available, particularly those derived from Web 2.0 marketing. Other studies such as Cobelli and Wilkinson (2020) consider that wine e-commerce is becoming increasingly popular as the consumer can easily access information about wine through the web. However, the adoption of online wine purchasing by consumers is still limited and it is not clear whether the importance of the purchasing drivers may vary between online and offline wine consumers. Nonetheless, despite remarkable customer engagement, many customers resist the adoption of online wine purchasing. Balenovic et al., (2021) find that during the lockdown in Serbia, 14.7% of respondents bought wine online, but do not specifically consider the role of the apps in this behaviour.

Additionally, wine consumers are becoming increasingly engaged with mobile platforms, using mobile apps to not only acquire wine knowledge but also to guide them in purchasing decisions. According to the results from a study published by Sonoma State University Wine Business, 23% of wine consumers use wine apps to decide which wine to buy. These apps have put power in the hands of consumers, especially those already knowledgeable and who invest in the wine purchase decision (Higgins, Woolf and Mitchell, 2014) and benefit from the development of artificial intelligence.

Accordingly, we can define the third research question as follows:

H3: The use of a wine app contributes to increasing the probability of online buying behaviour

2.4. The impact of psychological aspects during the lockdown on online wine buying patterns

In general, consumption is conditioned by psychological and cultural factors (Callwood, 2013). Its pattern responds to the motivations, perceptions, learning, beliefs and attitudes of consumers as well as customs and social guidelines. Covid-19 has, therefore, brought about a radical change in our wine lifestyle and our behavioural and cultural habits.

In the case of wine, two opposite effects had been detected. On the one hand, a positive association has been found between its consumption and psychological factors such as sensory gratification, social bonding (Dunbar *et al.*, 2017), pleasant experience (Peele and Grant, 1999), or the creation of a positive or relaxed mood and the ability to cope with difficulties and to adapt (Foster, Neighbors and Prokhorov, 2017).

However, on the other hand, Covid-19 has generated extreme fear and anxiety (Agnoli and Charters, 2022). The effects of anxiety on wine consumption during the pandemic constitute an aspect that still needs to be addressed. Anxiety can play an important role in shaping consumers' decision-making processes and affect consumption itself.

The psychological aspects have an impact on the purchase of different types of beverages. These aspects drive the fourth research question:

H4: Psychological variables affect the probability to buy wine online during the lockdown (Covid-19)

3. Empirical analysis

3.1. Data

The data used in this study were previously collected by the European Association of Wine Economists and the INSEEC – School of Business and Economics of the University of Bordeaux to explore the effects of the COVID-19 pandemic on alcohol consumption between 17 April and 10 May 2020 through the SurveyMonkey platform. The data collection process used the exponential discriminatory snowball sampling technique (for more details, see Compés et al., 2021; Dubois et al., 2021; Rebelo et al. 2021).

Table 1 includes the list of all of the variables used in this study and the descriptive statistics for Portugal and Spain and simultaneous for both countries.

Table 1. Variables and descriptive statistics

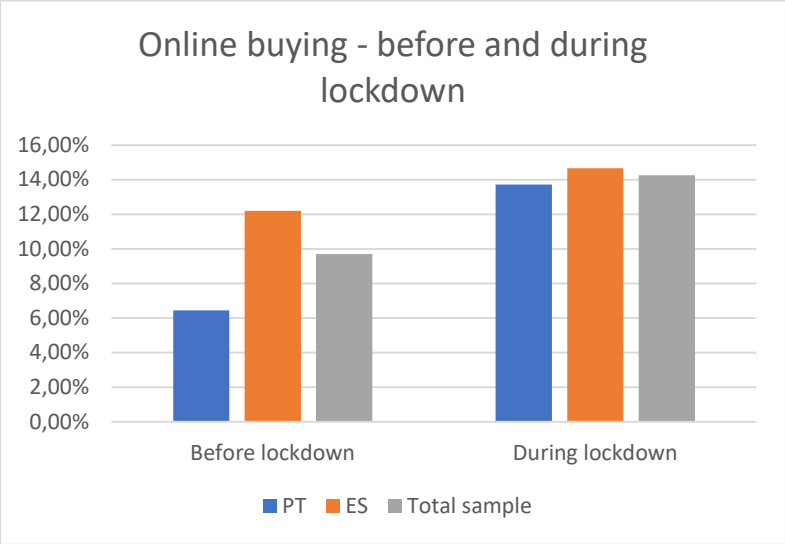
	Portugal (n=1940)		Spain (n=2549)		Total (n=4489)	
Online purchasing pattern	No.	%	No.	%	No.	%
Online wine buying frequency during lockdown						
Did not buy	1611	83.04	2060	80.82	3671	81.78
For the first time	97	5.00	174	6.83	271	6.04
Same frequency	132	6.80	213	8.36	345	7.69
Increased frequency	100	5.15	102	4.00	202	4.50
Wine related variables						
Wine consumption before lockdown						
Never	57	2.94	90	3.53	147	3.27
Less than once a month	153	7.89	206	8.08	359	8.00
At least once a month	236	12.16	404	15.85	640	14.26
At least once a week	801	41.29	1190	46.68	1991	44.35
Daily	693	35.75	659	25.85	1352	30.12
Wine consumption during lockdown						
Less frequent	281	14.48	492	19.30	773	17.22
As usual	1027	52.94	1140	44.72	2167	48.27
More frequent	632	32.58	917	35.97	1549	34.51
Consumption of beer before lockdown						
Never	362	18.66	231	9.06	593	13.21
Less than once a month	450	23.20	237	9.30	687	15.30
At least once a month	450	23.20	328	12.87	778	17.33
At least once a week	595	30.67	1398	54.85	1993	44.40

Daily	83	4.28	355	13.93	438	9.76
Consumption of beer during lockdown						
Less frequent	628	32.37	838	32.88	1466	32.66
As usual	1157	59.64	1158	45.43	2315	51.57
More frequent	155	7.99	553	21.69	708	15.77
Socio-economic characteristics	No.	%	No.	%	No.	%
Gender						
Male	1200	61.86	1518	59.55	2718	60.55
Female	740	38.14	1031	40.45	1771	39.45
Residence in urban area						
Yes	968	49.90	961	37.70	1929	42.97
No	972	50.10	1588	62.30	2560	57.03
Generation						
Boomer	86	4.43	91	3.57	177	3.94
Generation X	669	34.48	1121	43.98	1790	39.88
Generation Y	969	49.95	1150	45.12	2119	47.20
Occupation						
Agricultural sector	298	15.36	334	13.10	632	14.08
Industrial sector	201	10.36	346	13.57	547	12.19
Services sector	1043	53.76	1461	57.32	2504	55.78
Income level						
Finding it very difficult on present income	31	1.71	26	1.02	57	1.27
Finding it difficult on present income	201	11.06	100	3.92	301	6.71
Coping on present income	1054	58.01	564	22.13	1618	36.04
Living comfortably on present income	531	29.22	1647	64.61	2178	48.52
Prefer not to answer	123	6.30	212	8.32	335	7.46

Mobile app/Digital adoption	No.	%	No.	%	No.	%
Has a wine app on the smartphone						
No	1270	65.46	1976	77.52	3246	72.31
Yes	670	34.54	573	22.48	1243	27.69
Psychological Covid-19 related variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Fear of virus (1=strongly disagree, 5=strongly agree)	3.49	0.91	3.59	1,02	3.55	0.98
Fear of crisis (1=strongly disagree, 5=strongly agree)	4.43	0.65	4.44	0,82	4.44	0.75
Fear of isolation (1=strongly disagree, 5=strongly agree)	-0.08	0.89	-0.12	0,96	-0.10	0.93

To assess the factors that derive changes in the purchasing patterns in the online trade channel, we must first address the generic consumer decisions regarding online buying. Thus, Figure 1 shows the share of the sample that mentioned purchasing wine online before and also during the lockdown.

Figure 1. Online trade channels before and during the lockdown



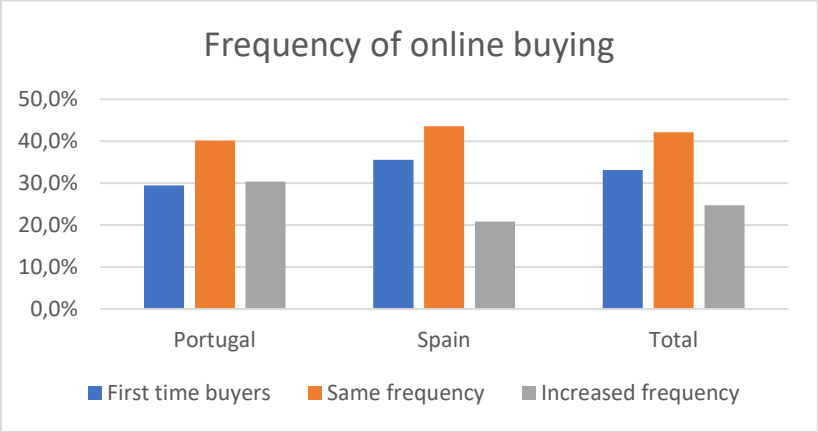
Source: Own elaboration

A quick overview shows the growth of this trade channel during the pandemic period. Before the lockdown, online trade was used by just 9.7% of the respondents. Interestingly, during the lockdown, this channel was used by 14.3% of the respondents, which reveals a

global growth of nearly 5 p.p.. Further analysis reveals that this growth was higher in Portugal (7 p.p.), where, until then, it was less used than in Spain (2.5 p.p.).

Concerning the changes in the frequency of online buyers, i.e., the dependent variable of this study, there are three different categories (applied to those respondents who mentioned using this sales channel) according to the behaviour during the lockdown when compared to the previous period. The three categories can be ordered as buying for the first time; same frequency and increased frequency. Figure 2 shows the distribution of responses of each category.

Figure 2. Frequency of online buying



Source: Own elaboration

A few interpretations can be made from Figure 2. First, more consumers mentioned having bought for the first time (33.1%) than those who mentioned having increased their purchase frequency (24.7%). Second, the most common answer in the sample was having bought with the "same frequency as before" (42.2%)

Concerning the wine-related variables, the frequency of wine consumption before the lockdown is assessed, with the majority of respondents being regular wine consumers, (at least once a week consumptions account for 74.5% of total answers). The consumption pattern during the lockdown is also assessed and measured through the changes in consumption, less frequent, as usual, and more frequently referenced to the previous frequency of wine consumption. It is noticeable that 34.5% of total respondents increased the frequency of consumption, while only 17.2% indicated a decrease.

The consumer profile is also identified for beer, which was included to measure the role of a substitute product for wine. Here, differences are identifiable. Only 34.9% of Portuguese

respondents can be labelled as regular consumers, whereas in Spain, this share increases to 68.78%.

Within the sociodemographic characteristics, the sample includes a majority of male respondents (60.6% in total). 49.9% of the Portuguese respondents lived in urban areas as opposed to 37.7% in Spain. In terms of age, the sample is divided into generations so as to capture the generational effect regarding the use of online trade channels. Therefore, only 3.9% globally were "baby boomers", i.e., aged between 57 and 75 years old; 39.9% were in the "generation X" range, that is, the 41-56 year olds segment; and the most frequent generation is the "generation Y", i.e., between 25 and 40 years old, accounting for 47.2% of the total respondents.

In addition, dummy variables are considered in order to capture the sector of activity of the respondents, with the majority working in the services sector (53.8% in Portugal and 57.3% in Spain). Concerning the income level, which may influence the ability to buy (or not), it is noticeable that the most frequent answer in Portugal is "coping on present income" with 58.0% of the respondents, whereas in Spain, the most frequent answer was "living comfortably on present income", with 64.6% of total respondents. This, therefore,suggests that the Spanish respondents have a stronger purchase power.

Additionally, having a wine app for smartphones might be relevant for measuring the degree of digital adoption (and, therefore, the willingness to use online channels) of the consumers. The use of such a tool is higher among Portuguese respondents (34.5%) than among their Spanish counterparts (22.5%).

Regarding the psychological Covid-19 related variables, the role of fear of the virus, the fear of a crisis and the feeling of isolation may influence general buying patterns and specifically wine buying through online channels. Thus, in this sample, Portuguese and Spanish respondents show very similar reactions to Covid-19, particularly with high levels of fear through uncertainty.

3.2. Results

To provide thorough answers to the hypotheses stated in section 2, this section analyses the impacts of the lockdown on online buying frequency. Thus, the first step is to identify the factors that determine the probability of online buying. Consequently, a binomial probit regression is used, summarised as

$$\Pr(y_j \neq 0 \mid x_j) = \Phi(x_j\beta) \quad (1)$$

where y is the dependent variable, i.e., the positive outcome is if the respondent buys wine online, and the negative outcome is if the respondent does not buy online (ever). With this, we can estimate the coefficients for the probability of buying wine in the online channel. This allows us to infer the main determinants of such a decision. A methodological question is, however, the possibility of the presence of sample selection in this sample. Therefore, we first estimated a Heckman selection model (Heckman, 1979), which corrects for this issue by estimating separately a selection equation considering all the outcomes, and then, the equation of interest including only the positive outcomes. Then, by analysing the coefficient of correlation in the Heckman model, we can observe that when the variables considered for the main equation include the sociodemographic and psychological dimensions, the coefficient of correlation, ρ, becomes non-significant. Thus, with these variables, sample selection is not a relevant problem and robust estimates can be obtained through probit modelling.

Additionally, in order to assess potential structural differences between countries, we have estimated the probit regression model for both countries (jointly) and the regression re-run by adding the set of explanatory variables multiplied by a country factor (dummy variable). We also performed a likelihood ratio test with the nested and global models (see appendix). This allows us to identify structural (partial regression estimated parameters) differences between the countries' data. Therefore, the analysis should be conducted separately for Portugal and Spain. Consequently, Table 2 presents the results of the three econometric estimations, including only the variables that are statistically significant for at least one model.

Table 2. Probit model with stepwise technique to assess the probability of online buying during the lockdown (Covid-19)

	Variable	Global	Portugal	Spain
Wine related variables	Wine consump. during lockdown	0.2554*** (0.0300)	0.2753*** (0.0474)	0.2471*** (0.0398)
	Beer consump. during lockdown			-0.0710** (0.0290)
Socio-economic characteristics	Gender			
	Residence urban area	0.1196** (0.0498)	0.1957*** (0.0758)	
	Generation Boomer			
	Generation X			

	Generation Y	0.3180*** (0.0496)	0.3815*** (0.0772)	0.3005*** (0.0671)
	Agricultural worker			-0.1936* (0.1061)
	Industrial worker			
	Services worker			-0.1669** (0.0735)
	Income level	0.1035*** (0.0239)	0.1478*** (0.0422)	0.0711** (0.0293)
Wine app	Wine app	0.6207*** (0.0506)	0.4670*** (0.0762)	0.7745*** (0.0693)
Psychological Covid-19 related variables	Fear of virus			
	Fear of crisis			
	Fear of isolation		0.0798* (0.0434)	-0.0657* (0.0342)
	Constant	-2.8931*** (0.1591)	-3.1947*** (0.2534)	-2.97655*** (0.2202)
	N	4489	1940	2549
	Log-likelihood	-1662008	-699942	-9412821
	Pseudo R^2	0.0961	0.0973	0.1144
	LR	353.40***	150.91***	243.22***

The results from Table 2 show that the probability of buying wine online was higher for those who showed higher levels of consumption during the lockdown. Additionally, the substitution effect with beer was found to be statistically significant for Spanish respondents, who showed a lower probability of buying wine online for consumers who had increased the consumption of beer during the lockdown.

Regarding the socioeconomic characteristics, the results show a higher probability of online wine purchases for those who live in urban areas (only for Portugal), people with higher levels of income, and younger (Generation Y) consumers, and for Spain, agricultural and services workers tend to display a lower probability of buying wine online.

Respondents who mentioned having a mobile app dedicated to wine are more likely to have bought wine online during the lockdown. Specifically, having a wine app increases the probability of online buying by 46.70% in Portugal and by 77.45% in Spain.

Amongst the psychological factors, only the fear of isolation reveals to have some kind of statistical significance, and it has different results for both countries. For Portuguese consumers, the distress caused by the fear of isolation is linked to a higher probability of

online wine purchases, whereas for Spanish consumers, this psychological factor reduces the probability of engaging in such online purchases.

After this preliminary analysis, this study employs for those who buy wine online (filtered variable), an ordered probit estimation (McKelvey & Zavoina, 1975) to explain the variation in the ordered categorical dependent variable, the online buying frequency.

In this model, a latent regression is specified as follows:

$$y_i^* = \beta' x_i + \varepsilon_i \quad (2)$$

$$y_i = j \quad \text{if} \quad \alpha_{j-1} < y_i^* \leq \alpha_j$$

where α_j are the unknown threshold parameters between which the categorical responses are estimated. Thus, the probability to select alternative *j* is given by

$$Prob[y_i = j] = \Phi(\alpha_j - \beta' x) - \Phi(\alpha_{j-1} - \beta' x), \quad (3)$$

where $\Phi(\bullet)$ is the standard normal cumulative distribution function. Based on the continuity assumption, probabilities require $\alpha_j > \alpha_{j-1}$ and including a constant term requires $\alpha_0 = 0$.

Given the number of explanatory variables, a stepwise regression method was used, with the advantage of improving the statistical quality and the reading of the model by selecting only the statistically significant variables. Thus, we estimate the ordered probit model, following a stepwise approach for Portugal and Spain separately. Table 3 provides the results of these estimations.

Table 3 –Ordered Probit model to assess the variation of online wine buying frequency during the lockdown

	Variable	Global	Portugal	Spain
Wine related variables	Wine consump. during lockdown	0.562** (0.0642)	0.2741** (0.1058)	
	Beer consump. during lockdown			
Socio-economic characteristics	Gender			0.2374** (0.1144)
	Residence urban area			-0.2330** (0.1053)
	Generation Boomer		-0.6277** (0.2886)	0.8020**
	Generation X	0.3138** (0.1421)	-0.3807*** (0.1394)	0.9416*** (0.2530)
	Generation Y	0.4429*** (0.1372)		0.9614*** (0.2484)
	Agricultural worker			
	Industrial worker		0.4758** (0.1844)	

	Services worker			
	Income level			
Wine app	Wine app	0.2801*** (0.0793)		0.3219*** (0.1038)
Psychological Covid-19 related variables	Fear of virus			
	Fear of crisis			
	Fear of isolation			
	N	818	329	489
	Log-likelihood	-8.622.811	-3.438.985	-4.988.755
	Pseudo R^2	0.0199	0.0404	0.0345
	LR	34.93***	28.96***	35.62***

Source: Own ellaboration

Given that the parameters estimated have no behavioural meaning, the marginal effects are particularly meaningful and calculated as:

$$\frac{\partial Prob[y=j|x]}{\partial x} = \left[\varphi\left(\alpha_{j-1} - \beta' x\right) - \varphi\left(\alpha_j - \beta' x\right)\right]\beta \quad (4)$$

where φ(•) is the density function. For dummy variables (d), these marginal effects are obtained by a difference of probabilities:

$$\Delta_j(d) = \left[\Phi\left(\alpha_j - \beta' x + \gamma\right) - \Phi\left(\alpha_{j-1} - \beta' x + \gamma\right)\right] - \left[\Phi\left(\alpha_j - \beta' x\right) - \Phi\left(\alpha_{j-1} - \beta' x\right)\right], \quad (5)$$

where γ is the coefficient of d. The results of the computation of the marginal effect for each country individually and the global sample (see appendix) have more than one interpretation. Looking first at the aggregate without contemplating the country of residence, we can see that those who consumed wine less frequently than previously (by 4.8%), those who had a wine app on their cell phone (by 9.7%), and those belonging to generations X and Y (by 9.9% and 16.3%) were less likely to buy online wine for the first time during the pandemic. Moreover, the likelihood of increasing the frequency of buying wine online during the lockdown increased for those who increased their wine consumption during the lockdown (by 4.1%), those who had a wine app (by 8.5%), and those from generations X and Y (by 8.7% and (14.2%).

The results by country of residence show some differences. The probability of having bought wine for the first time decreases for Spanish males (by 8.4%), those who declared having a wine app installed on their phones (by 9.7%); and all generations. Moreover, the probability of having increased the frequency of buying online was higher among Spanish males (by 6.6%), those having a wine app (by 8.5%), boomers (by 22.1%), generation X (by 26.6%), and generation Y (by 26.6%).

In Portugal, as in Spain, the probability of buying wine online for the first time was lower for those who increased their wine consumption during the lockdown and industrial workers. At the same time, the probability of buying wine online increased for these consumers and industrial workers. However, unlike in Spain, the probability of decreasing the purchase of wine online increased for boomers and generation X. For both, their probability of increasing online wine purchases decreased.

Considering the different meanings of the answers of the dependent variable "online buying frequency", i.e., for the first time, buying as usual, or increased frequency during the lockdown, it is reasonable that differences in each subpopulation arise. Particularly, each explanatory variable might indicate different realities in subsamples. Therefore, testing for differences in proportions is key to the appropriate interpretation of the results and offers a complementary reading to those of the marginal effects. To do this, first, we test whether all the subsamples of an explanatory variable have the same proportion of defections. The Chi^2 test of equality of proportions was performed (see appendix). The null hypothesis is equality of proportions. A rejection implies that there are different behaviours within a variable (sub-populations). The results show that for the significant variables of the model, differences in proportions are identified. This means that there are indeed differences in the subpopulations for the variables "gender", "generation boomer", "generation X", "generation Y", "lockwine consumption" and "wine app smartphone". This also constitutes a justification for the non-significance of the remaining variables in the regression model.

Despite differences being identified, the Chi^2 test does not allow us to conclude the origin of such differences. More precisely, as a further step, we have used the Marascuilo (1966) procedure for those variables that display differences in proportions, in order to identify the origin of such differences.

In the Marascuillo procedure, we first compute the differences $|p_i - p_j|$ with $i \neq j$ for all possible pairs. The n_i and n_j represent the whole sample population of alternatives i and j. Then, the critical values are obtained from:

$$r_{ij} = \sqrt{\chi^2_{\alpha,k-1}}\sqrt{\frac{p_i(1-p_i)}{n_i} + \frac{p_j(1-p_j)}{n_j}} \quad (6)$$

where $\chi^2_{\alpha,k-1}$= Chi-square with a level of significance α and K-1 degrees of freedom. The pairs that have a test statistic that exceeds the critical value, i.e., $|p_i - p_j| > r_{ij}$, are statistically significant.

According to the analysis of the Marascuilo procedure results (see appendix), the relationship between the frequency of online buying and wine consumption during the

lockdown identifies differences in those buying behaviours that maintain and increase the frequency of online wine buying. This indicates that the lockdown has had a positive impact on the frequency of online wine buying for older wine consumers. Moreover, this suggests that there is a different online buyer profile for those who display higher levels of consumption during the lockdown, which corroborates the results of the ordered probit model.

Concerning socioeconomic characteristics, there is a difference in proportions in gender. Specifically, being a male and answering "1 – for the first time of online buying" shows a statistical difference from the male respondents. Combining this with the previous results (those in Tables 2 and 3), it is possible to identify which pairs of categories generate the behavioural differences in the sub-sample. The significant difference in this process allows us to affirm that men have a significantly higher proportion of dropouts than non-men.

Mostly, significant differences are found between men making online wine purchases for the first time and also for the Generation Boomer and the increased frequency of wine buying online during the lockdown. However, different behaviour is observed in the rest of the cohorts by generation. Thus, there is a greater weight of Generation X who make online purchases for the first time during the lockdown, while in Generation Y, this behaviour is different for those buyers who have maintained or increased their frequency of buying wine online during the lockdown.

Finally, it is worth noting the emergence of wine apps and their relationship with the frequency of online wine purchases during the lockdown. This is a relevant aspect, as having a specific wine app is a differentiated purchase channel compared to online purchases on generic platforms.

5. Conclusion and discussion

This study seeks to identify the impacts of the imposed lockdowns on the online wine sales frequency. We have established four main research hypotheses that address (i) the relationship between wine consumption and online buying; (ii) the relationship between socioeconomic characteristics of consumers and the behaviour towards the online sales channel; (iii) the relevance of mobile apps dedicated to wine to increase online purchases; (iv) the psychological factors related to the distress of lockdown.

With respect to H1, the results show that there is a positive link between increased consumption during the lockdown and increased frequency of online wine buying

(including in this increase those who bought wine online for the first time), therefore confirming the hypothesis.

Our results show a partial verification of H2, since individual and household characteristics and circumstances influence the probability of online buying of wine, but there is a different impact of those characteristics regarding the country of analysis, either Portugal or Spain (or the two as a whole). Specifically, gender is found to be a relevant determinant of online buying, but only for Spanish consumers. Similarly, living in an urban area also increases the probability of buying wine online in Spain. In Portugal, these are no relevant characteristics. Furthermore, generational differences are identified and again, with different results for Portugal or Spain.

In the case of H3, the use of wine apps on mobile phones contributes to increasing the probability of buying online-This is confirmed for Spanish consumers and also for the global sample, but not for Portugal individually.

Finally, the psychological factors involving the distress of the imposed lockdowns are included in hypothesis H4. Interestingly, we do not find evidence that either the fear of the virus, the fear of a future economic crisis and the distress of isolation have influenced the variation in the frequency of online wine shopping.

The article also highlights that the variables that have influenced the variation in the frequency of online wine purchases have generally been different between Spain and Portugal. This indicates that even between two countries that are culturally and geographically very close there are behaviours that can be considered very idiosyncratic and therefore make it difficult to draw generalisable conclusions for other countries.

However, one result that can be considered exportable and highly generalisable is that such an extraordinary event as the lockdown clearly boosted the purchase of wine online, a channel that had little relevance and that has grown under these special circumstances. Although we do not yet have comparable data, it is predicted that, thanks to this boost, online sales will grow even more in the future. Consequently, the wine industry will have to pay special attention to the possibilities of increasing its sales through these channels (Niklas et al., 2022). Companies that make the most of these opportunities may be more likely to increase their sales.

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Appendix – Marginal effects

Marginal effects - Portugal

Variable	Category 1: For the first time	Category 2: Same frequency	Category 3: Increased frequency
Wine related variables			
Wine consumption during the lockdown	-0.8908***	-0.0024	0.0915***
Socio-economic characteristics			
Gender	-	-	-
Residence in urban areas	-	-	-
Generation Boomer	0.2367**	0.0055	-0.2422*
Generation X	0.1444**	0.0033	-0.1478***
Generation Y	-	-	-
Industrial worker	-0.1526**	0.0035	0.1561***
Wine app			
Wine app	-	-	-
Psychological variables			
Fear of isolation	-	-	-

Marginal effects: Spain

Variable	Category 1: For the first time	Category 2: Same frequency	Category 3: Increased frequency
Wine related variables			
Wine consumption during lockdown	-	-	-
Socio-economic characteristics			
Gender	-0.0842**	0.0187*	0.0656**
Residence in urban areas	0.0826**	-0.0183**	-0.0643**
Generation Boomer	-0.2845**	0.0631**	0.2214**
Generation X	-0.3341***	0.0741***	0.2600***
Generation Y	-0.3411***	0.0756***	0.2655***
Industrial worker	-	-	-
Wine app			
Wine app	-0.1142***	0.0253**	0.0889***
Psychological variables			
Fear of isolation	-	-	-

Marginal effects: Global sample

Variable	Category 1: For the first time	Category 2: Same frequency	Category 3: Increased frequency
Wine related variables			
Wine consumption during lockdown	-0.0481**	0.0062*	0.0419**
Socio-economic characteristics			
Gender	-	-	-
Residence in urban areas	-	-	-
Generation Boomer	-	-	-
Generation X	-0.0993**	0.0127*	0.0866**
Generation Y	-0.1629***	0.0209**	0.1421***
Industrial worker	-	-	-
Wine app			
Wine app	-0.0970***	0.0124**	0.0846***
Psychological variables			
Fear of isolation	-	-	-

Chi² test of equality of proportions

	Variable	Chi² squared test
Wine related variables	Wine consump. during lockdown	33,9445***
	Beer consump. during lockdown	9,3817
Socio-economic characteristics	Gender	7,8216**
	Residence in urban area	1,7423
	Generation Boomer	6,4898**
	Generation X	19,9773***
	Generation Y	2,09096***
	Agricultural worker	1,4000
	Industrial worker	1,7720
	Services worker	0,5844
	Income level	4,3196
Wine app	Wine app smartphone	17,5908***
Psychological Covid-19 related variables	Fear of virus	6,5698
	Fear of crisis	6,6235
	Fear of isolation	111,6862

Source: Own ellaboration

Marascuilo Procedure statistics

	Variable pairing				Value	Critical	Significant
	Variable	N	Variable	N			
Socio-economic characteristics	Frequency of online buying vs Wine consumption during lockdown						
Wine related variables	For the first time =1	271	Less frequent=1	22	0.0148	0.0562	No
	Same frequency =2	345	Less frequent=1	26	0.0366	0.0661	No
	Increased frequency =3	202	Less frequent=1	9	0.0514	0.0564	No
	For the first time =1	271	As usual=2	114	0.0953	0.0986	No
	Same frequency =2	345	As usual=2	178	0.1286	0.1073	Yes
	Increased frequency =3	202	As usual=2	59	0.2239	0.1232	Yes
	For the first time =1	271	More frequent=3	135	0.0895	0.9861	No
	Same frequency =2	345	More frequent=3	141	0.1652	0.1102	Yes
	Increased frequency =3	202	More frequent=3	134	0.2547	0.1040	Yes
Socioeconomic characteristics	Frequency of online buying vs Gender						
	For the first time =1	271	Male=1	99	0.1044	0.0921	Yes
	Same frequency =2	345	Male=1	90	0.0485	0.1020	No
	Increased frequency =3	202	Male=1	64	0.0560	0.1034	No
	Frequency of online buying vs Generation boomer						
	For the first time =1	271	Boomer=1	13	0.0042	0.0507	No
	Same frequency =2	345	Boomer=1	18	0.0366	0.0563	No
	Increased frequency =3	202	Boomer=1	2	0.0514	0.0432	Yes
	Frequency of online buying vs Generation X						
	For the first time =1	271	Gen. X=1	89	0.1035	0.0956	Yes
	Same frequency =2	345	Gen. X=1	149	0.0366	0.1205	No
	Increased frequency =3	202	Gen. X=1	50	0.0514	0.1046	No
	Frequency of online buying vs Generation Y						
	For the first time =1	271	Gen. Y=1	141	0.0333	0.9928	No
	Same frequency =2	345	Gen. Y=1	168	0.1629	0.1005	Yes
	Increased frequency =3	202	Gen. Y=1	138	0.1962	0.1093	Yes
Wine app	Frequency of online buying vs Wine app smartphone						
	For the first time =1	271	Yes=1	107	0.1269	0.0981	Yes
	Same frequency =2	345	Yes=1	180	0.1844	0.1066	Yes
	Increased frequency =3	202	Yes=1	117	0.0575	0.1129	No

Source: Own ellaboration

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Depósito Legal Z-1411-2010. ISSN 2171-6668

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