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Covid-19 lockdown and wine consumption frequency in Portugal and Spain*

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Abstract

Aim of study: This study aims to analyse how psychological factors related to the Covid-19 lockdown affected the frequency of wine consumption among Iberian consumers.

Area of study: To achieve this goal, we used data collected from an online survey in Europe comprising 4489 observations from Portuguese and Spanish samples.

Material and methods: Using an ordered probit model, we analysed the wine consumption frequency as a function of a set of explanatory variables related to psychological factors, sociodemographic variables, consumption characterisation and channels of trade variables.

Main results: The identification of the hedonic nature of wine consumption explains the increase in frequency, while the negative feelings associated with the lockdown and health concerns are not relevant, which implies a different effect on consumption than in the case of other disasters. Consumer loyalty before the lockdown and the role that technology has played in explaining the frequency of consumption in the form of apps, online purchasing and digital drinks opens up a new horizon in the study of consumer behaviour.

Research highlights: Although econometrically different, the impact of the Covid-19 crisis tends to be felt similarly among the Iberian countries. The effects of psychological impacts related to feelings of Covid-19 of the lockdown does not show impact in wine consumption behaviour. The consumer background and behavioural attitude towards wine explain most changes in consumption patterns.

Additional key words: wine economics, consumer behaviour; psychological factors, probit regression

Authors' contributions: JR, SF, TG, RC, VP and KS: surveys; JR, SF and TG: data and statistical analysis. JR, RC and VP: intellectual content and hypotheses. KS: interpretation of data and conclusions. JR, RC, VP and KS: critical revision of the manuscript.

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Supplementary material (Table S1 and Annex) accompanies the paper on SJAR's website

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* This article replaces the article with the same title (e0105) that has been published in early June 2021. The reason for its replacement is that there was incorrect coding in the results of the survey that constituted our main source of data. This survey was designed by a group of researchers from the board of the European Association of Wine Economists, EuAWE (<https://www.euawe.com/about-us/>) - and from the INSEEC (School of Business and Economics of University of Bordeaux). Subsequently, the survey was pre-tested by conducting an online survey in European countries, namely France, Italy, Portugal and Spain between 17 April and 10 May 2020, through the SurveyMonkey platform and using the exponential discriminatory snowball sampling technique. Consequently, the survey is the result of a collective effort bringing together 18 academics working under time pressure (the survey was designed and implemented during the first lockdown). Many changes were made during the creation and testing of the questionnaire (in seven different languages). Numerous suggestions for improvement were also transcribed into modifications, all centralised in a single document. Using these data, the authors performed the econometric analyses on which this article is based. However, few days after the article was published, the project participants responsible for processing the survey detected an inversion in the labelling of two categories (not on levels). The labelling of two variables had not been accurately modified in the final version of the questionnaire used for coding, hence there was an inversion between the values of two consumption variables in the dataset. This inversion does not affect the levels that are correctly re-transcribed from SurveyMonkey. These inverted categories constituted our dependent variable. Specifically, the frequencies of consumption had been incorrectly assigned from as usual to less and vice versa. Upon noticing this error, the authors requested that the previous version of the article be replaced so that the results could be corrected, once the regressions had been performed with the data correctly coded. This is the definitive version of the article using the correctly coded data.

Introduction

Since the Second World War global wine consumption has increased remarkably. This trend has been driven by increasing globalisation, the emergence of new producing countries and regions, greater openness and expansion of international trade, and a growing standardisation of the typology, habits and attitudes of consumers (Anderson & Pinilla, 2018). However, in the traditional producing countries of Southern Europe, namely France, Italy, Portugal and Spain, consumption has decreased notably, while that of other alcoholic beverages, particularly beer, has increased. In general, in Western countries, there has been some convergence in the consumption patterns of alcoholic beverages. There is abundant literature explaining these trends and analysing the determinants of alcoholic beverage consumption (Fogarty, 2010; Holmes & Anderson, 2017; Anderson *et al.*, 2018).

However, the behaviour of alcoholic beverage consumers can also be affected by unexpected shocks, such as economic or financial crises (Bor *et al.*, 2013; Garbinti *et al.*, 2020), wildfires (Thach & Eyler, 2017), earthquakes (Forbes & Wilson, 2018) and threats or terrorist attacks (Gergaud *et al.*, 2018).

The Covid-19 pandemic and the subsequent lockdown, the resulting containment and associated public and individual control measures is an entirely new and unknown phenomenon in modern economic and social history, with disruptive psychological and behavioural effects. Specifically, Covid-19 has generated extreme fear and anxiety. It has disrupted routines and people have developed “disproportional cognitive, affective, or behavioural responses to the objects and situations that they associate with the Covid-19 pandemic and severe deteriorations may occur in the physiological and psychological functionalities” (Arpaci *et al.*, 2020, p: 2).

At the microeconomic level, the behaviour of wine consumers has usually been analysed using variables related to both subjective and objective wine attributes, consumer motivations, together with sociodemographic characteristics (*e.g.* Charters & Pettigrew, 2008; Gonçalves *et al.*, 2020; Ribeiro *et al.*, 2020). Observations of the determinants of wine consumption frequency during the Covid-19 lockdown suggest that variables related to psychological behaviour should be added to the hedonic demand function as explanatory variables (taste, health or relaxation).

In this context, this study aims to analyse how psychological factors related to the Covid-19 lockdown crisis have affected the wine consumption frequency of Iberian consumers. Consumer behaviour is heterogeneous, not only between social classes but also between countries (Bor *et al.*, 2013; Garbinti *et al.*, 2020). Therefore, one research question in this study is whether the impact of the lockdown (Covid-19) has been homogeneous between

countries. The impact of Covid-19 was probably felt differently in Spain and Portugal. Compared to Spain, Portugal had a lower mortality rate and a less restrictive lockdown, which was certainly manifested in the psychological and behavioural attitudes concerning the frequency of wine consumption.

For this purpose, based on samples collected for Spain and Portugal, we have estimated an ordered probit model using a stepwise approach, to determine consumer behaviour (consumption frequency). To do this we used significant psychological variables and control variables related to the sociodemographic characteristics of respondents as well as wine-related variables, such as the reasons for drinking wine and purchasing and drinking habits.

Material and methods

Theoretical approach and hypothesis

Covid-19 has caused a global health crisis unprecedented in our time. The WHO (World Health Organization) recognised it as a pandemic on 11 March 2020. From that moment, many countries around the world rushed to decree a general State of Emergency to confine the population and restrict numerous non-essential activities. The Spanish government declared the state of alarm on 14 March 2020, and, after several extensions, it remained in force until 21 June. Portugal meanwhile declared the state of alarm on 18 March and it lasted until 2 May. Since the end of the state of national emergency, local lockdowns have been imposed in some municipalities or districts because of the emergence of serious outbreaks of the infection in a second wave during the summer months.

This situation has forced millions of citizens to stay in their homes for weeks and has caused the closure, at least temporarily, of many workplaces. Confinement reduces social contacts and limits both work-related and personal activities. This has essential cognitive, affective and behavioural consequences (Arpaci *et al.*, 2020). Isolation generates feelings of loneliness; the evolution of the crisis causes negative thoughts and behaviours that are inexorably modified. Fear of contagion and anxiety about the future, among other factors, have a negative psychological impact on many citizens (Atalan, 2020; Brodeur *et al.*, 2020; Chaix *et al.*, 2020; Sibley *et al.*, 2020; Van Hoof, 2020).

Being a catastrophe, this lockdown constitutes an extraordinary economic and natural social experiment for many social sciences, since it allows us to study the changes that occur in the lives of the people affected. A particularly exciting aspect is their behaviour as consumers, especially of products that are controversial due to the consequences of their excessive consumption. The most representative case is that of beverages with an addictive

alcoholic component (Bentzen *et al.*, 1999), particularly dangerous in the case of young people (Gil & Molina, 2009). Additionally, the interest in studying these kinds of products is more significant due to the limitations imposed during confinement, and even afterwards, on the HORECA channel (on-trade and off-trade), whose establishments have been closed for weeks. This channel is highly important for virtually all alcoholic beverages since it represents an important part of their sales. The HORECA channel represents around 30% of the total volume of wine sales—31% in Portugal (2017) and 29% in Spain (2018)—due to the habit of eating out and tourism. In terms of added value, they represent between 59% in Portugal (2017) and 66% in Spain (2018). Therefore, the closure of catering establishments has had a significant impact on wine sales in this channel (ICEX, 2019; Inter-profesional del Vino en España, 2020). For consumers, it represents a moment of social consumption.

Within these drinks, wine deserves special attention since its consumption has a specific cultural dimension given that it is closely linked to gastronomy, although in recent decades its hedonic function has become increasingly important (Platania *et al.*, 2016). Diet frameworks, such as the “Mediterranean alcohol drinking pattern” consider the wine consumption patterns identified as being healthy (Gunay & Baker, 2011; Bazal *et al.*, 2019). However, this does not mean that situations of abuse do not occur (Goldsmith & d’Hauteville, 1998).

In general, consumption is conditioned by psychological and cultural factors (McGuire, 1976; Callwood, 2013). Its pattern responds to motivations, perceptions, learning, beliefs and attitudes of consumers as well as customs and social guidelines. Often, the two types of factors are linked (Silva *et al.*, 2017).

In the case of wine, 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 & Grant, 1999), the creation of a positive or relaxed mood and the ability to cope with difficulties and to adapt (Sayette, 1993; Cooper, 1994; Stritzke *et al.*, 1996; Foster *et al.*, 2014). In the same way, Baum-Baicker (1985) identified five areas of psychological benefits derived from the moderate consumption of alcoholic beverages: (a) reduction of stress; (b) improved mood; (c) higher cognitive performance; (d) reduction of clinical symptoms and the incidence of depression (Gea *et al.*, 2013); and (e) better functioning in the elderly. These results are explained by the fact that alcohol releases dopamine and serotonin, neurotransmitters associated with the experience of pleasure (Lovinger, 1997; Banerjee, 2014).

With this background, the first hypotheses that this study will test is the impact of psychological variables on the consumption frequency during the lockdown

(Covid-19). In other words, whether the foreseeable increase in feelings of anguish, anxiety and worry during confinement caused changes in consumption patterns, in particular its frequency, since this can be an indicator of increased moments of discomfort. It will also explore whether other psychological variables related to the so-called psychological benefits derived from moderate consumption within the context of the lockdown were relevant. Frequency is, together with intensity, one of the two parameters that define the demand and consumption patterns of any good. In the case of alcoholic beverages, they cannot be treated as substitutes for one another, since each has different psychological and cultural implications (Heckley *et al.*, 2017), and they all have significant but different consequences on health (Attard *et al.*, 2019). Frequency is especially relevant for its ability to create habits that influence purchasing and consumption decisions in the medium and long term (Ji & Wood, 2007). Our hypothesis is:

H1: Psychological variables influenced the consumption frequency during the lockdown

Cultural factors have a significant national component, although interdependencies between countries are increasing. Thus, for example, research on the effects of the 2008 crisis on the consumption of some substances, including alcoholic beverages (Dom *et al.*, 2016) revealed significant differences between countries of the European Union. However, Leifman (2001) and Smith & Mitry (2007) found, at least in Europe, a relative cultural convergence between European countries regarding wine consumption patterns. Cultural patterns are related to consumption occasions in which the same consumer adopts different behaviours. For example, Hall & Lockshin (2000) established three models of consumption (consumption at parties, at work meals, and private consumption); the first two were eliminated during the lockdown.

In the case of the Covid-19 crisis, all countries have been affected, although not with the same intensity. Similarly, the quality of the public management of the crisis has not been the same either and this also affects the psychological state of the citizens. A particularly interesting case is that of Spain and Portugal, neighbouring countries of Iberia and culturally very close, although with differences in certain social behaviours and the evolution and incidence of the Covid-19 pandemic. Compared to Spain, Portugal had a lower mortality rate and a less restrictive lockdown (OECD, 2020). Our second hypothesis to test will be:

H2: The impact of Covid-19 on wine consumption was not homogeneous in Portugal and Spain with differences both in psychological and behavioural attitudes and in the frequency of consumption.

The survey, sample, and data collection

The survey was based on previous research (e.g., Martínez-Carrasco *et al.*, 2006; Bruwer & Buller, 2013; Thach & Olsen, 2015) and on the methodology used by the European Social Survey (<https://www.europeansocialsurvey.org>). To assess attitudes, beliefs and behavioural patterns, the survey was designed by a group of researchers from the board of the European Association of Wine Economists, EuAWE (<https://www.euawe.com/about-us/>) - and from the INSEEC (School of Business and Economics of University of Bordeaux). Subsequently, the survey was pre-tested by conducting an online survey in European countries, namely France, Italy, Portugal and Spain between 17 April and 10 May 2020, through the SurveyMonkey platform and using the exponential discriminatory snowball sampling technique¹. This method allows the urgency in the data collection process to be addressed. However, one possible limitation is that it can generate sample bias, failing to cover all socio-demographic layers of the target population, which tends to reduce as sample size increases (Taherdoost, 2016). The main goal of the study was taken into consideration and was inherent in the design of the survey, both in the content of questions as well as in the respective scales. Thus, the survey includes four groups of questions related to purchasing and consumption patterns, the consumption situation, Likert scales to assess feelings and emotions during the lockdown and sociodemographic information².

The preliminary results from the European study, released on 30 April 2021, indicate that, in general, the frequency of wine consumption increased during the lockdown period for more than 35% of respondents. However, the expense of alcoholic beverages decreased, with the average price of wine being lower when compared to normal conditions. The frequency of wine consumption from personal cellars increased as did consumption in a non-social context and especially drinking alone. When analysing the determinants of the increased drinking frequency, the anxiety generated by the Covid-19 crisis played a relevant role, with respondents in all countries expressing a powerful fear about the economic consequences of the crisis, as various factors of precariousness may arise or may be intensified.

For a better understanding of consumer behaviour in this time of crisis, we need to conduct additional research on how psychological factors affect the consumption of

alcoholic beverages, particularly wine. Therefore, the goal of this research is to study how psychological variables influenced consumption frequency during the lockdown period in the Iberian market, given a set of control variables related to consumption motivations, consumption behaviour, and socioeconomic characteristics. The sample comprises 1,940 respondents in Portugal and 2,549 in Spain, resulting in 4,489 valid responses (collected from 17 April to 10 May 2020). Table S1 [suppl] provides the socioeconomic characteristics of the respondents and the wine and Covid-19 related variables in both countries, as well as the results of the different means tests.

The majority of respondents are male (61.9% in Portugal and 59.6% in Spain), living in urban areas (50.1% and 62.3%, respectively), and employed in the services sector. In Portugal, unemployment is more prevalent, with 13.4% of respondents unemployed compared to 4.4% in Spain³. In the Portuguese sample, 30.9% are in the 41-50 age group, followed by 22% in the 51-60 age group. In Spain, 28.7% and 28.6% of the respondents belong to the 41-50 and 51-60 age categories, respectively. More than half of the sample in Portugal claim to be “coping on present income” (54.3%), while in Spain, the majority of respondents claim to be “living comfortably” (64.6%). Concerning the wine-related variables, the Portuguese show a higher degree of consumption with online interactions, with 34.5% (22.5% in Spain) having a wine app on their smartphones, 20.5% (12.5% in Spain) gaining improved wine knowledge through online content during the lockdown and 54.0% (40.3% in Spain) receiving online offers from winemakers to buy their wine online. In both countries, and during the lockdown, personal cellars were the second most important place for wine purchase after supermarkets, followed by the online channel. Regarding the motivations for wine consumption, accompanying food and wine tasting are the most common reasons for drinking wine, followed by socialising with friends. Of the Portuguese respondents, 73.8% stated that during the lockdown they organised digital gatherings to have a drink with family or friends almost daily, 12.5% at least once a week, 12.9% rarely, and less than 1% did not organise a digital gathering. On the other hand, 48% of the Spanish respondents organised such meetings daily, 12.6% at least once a week, 35.6% rarely and 2.5% never. With respect to the psychological variables related to the Covid-19 crisis, in both countries, the respondents feared the virus and the economic crisis as a consequence of the

¹ Given that the population aged 18 years and older in Spain and Portugal is the universe of interest of this study, and since the populations of this age group are respectively 36,011,970 in Spain (according to the Instituto Nacional de Estadística, www.ine.es, consulted on 3 December 2020) and 3,353,602 in Portugal (according to the PORDATA, www.pordata.pt, consulted on 3 December 2020), and since we have 2,549 and 1940 respondents in each country respectively, we can build a 99% confidence interval, with an error margin of 2.60%, to ensure that the responses are representative of the population). The responses were anonymous, and to avoid restrictive answers to possible sensitive questions (such as in the case of age and income), the methodology of the European Social Survey was used.

² The survey in Spanish and Portuguese is available in the Annex [suppl].

³ In this variable the sample values are different from those of the population, since unemployment in Portugal is lower than in Spain. This is because the sample is not stratified and runs the risk of not adequately reflecting all social layers, which represents a limitation.

pandemic. Nevertheless, they also agreed that this period provided an opportunity for positive initiatives. However, the fear of isolation is more prevalent in Spain, possibly due to the more widespread adverse effects of Covid-19 in that country⁴.

Figure 1 displays the observed values of wine consumption frequency during the lockdown by country. In both countries, almost half of the sample reports the same frequency of consumption when compared to normal circumstances, before Covid-19, with a greater prevalence in Spain. Less than 20% declared that they consumed wine less frequently and more than 30% reported that they consumed wine more frequently than usual.

Methodological approach

Model

The measure of wine consumption frequency is a categorical, ordinal variable. Therefore, the appropriate econometric model to represent the causal relationship, as opposed to a relationship that simply captures statistical associations, is the ordered probit model. This model identifies statistically significant relationships between explanatory variables and a dependent variable, accounting for unequal differences between the categories in this variable.

The ordered probit model, proposed by McKelvey & Zavoina (1975), is built around a latent regression, specified as follows:

$$y_i^* = \beta' x_i + \varepsilon_i, i = 1, \dots, N, \quad (1)$$

where i is the observation, y^* is the unobserved $N \times 1$ dependent variable, β' is the vector of the $K \times 1$ estimated

parameters or unknown marginal utilities, x is the of $N \times K$ covarites that are assumed to be independent of ε , and ε ($N \times 1$) is the error term including unobservable factors and assumed to be normally distributed across observations (with zero mean and unit variance). The probabilities underlying this model are:

$$Prob[y = 0] = \Phi(-\beta' x), \quad (2)$$

$$Prob[y = 1] = \Phi(\mu_1 - \beta' x) - \Phi(-\beta' x), \quad (3)$$

$$Prob[y = 2] = \Phi(\mu_2 - \beta' x) - \Phi(\mu_1 - \beta' x), \quad (4)$$

$$Prob[y = J] = 1 - \Phi(\mu_{J-1} - \beta' x). \quad (5)$$

where $\Phi(\bullet)$ denotes the cumulative distribution function, and $\mu_j > \mu_{j-1}$. Also, including a constant term will require $\mu_0 = 0$.

The likelihood function for the estimation of the model parameters is based on the implied probabilities. The parameters estimated have no behavioural meaning, but the partial effects are particularly meaningful and given by:

$$\frac{\partial Prob[y = j|x]}{\partial x} = [\varphi(\mu_{j-1} - \beta' x) - \varphi(\mu_j - \beta' x)]\beta. \quad (6)$$

where $\varphi(\bullet)$ is the density function.

The marginal effect for a dummy variable (D) would be obtained by a difference of probabilities, rather than a derivative, as follows:

$$\Delta_j(D) = [\Phi(\mu_j - \beta' x + \gamma) - \Phi(\mu_{j-1} - \beta' x + \gamma)] - [\Phi(\mu_j - \beta' x) - \Phi(\mu_{j-1} - \beta' x)]. \quad (7)$$

where γ is the coefficient of D .

Given the empirical specification of the model used in this study and to solve the research questions, we adopted

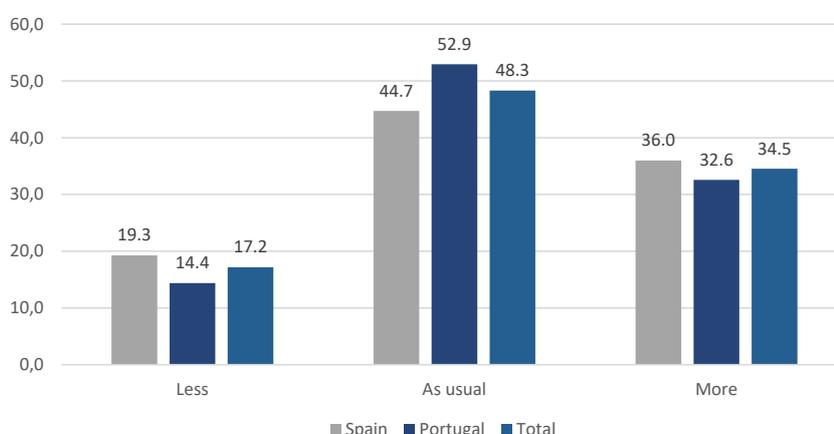


Figure 1. Wine consumption frequency during the lockdown, in %

⁴ The comparison between the two samples proved to be statistically different in most variables, except for gender, lock proc online frequency, fear of isolation, opportunity for initiatives, students, taste, romance and sleep motives, supermarket, wine store, online and drive-in points of sale.

the following process. First, in this type of model endogeneity is not a common issue since decisions regarding the consumption frequency of wine, beer and spirits can be simultaneous and interdependent. This can give rise to endogeneity with at least one of the explanatory variables (frequency of consumption of beer and spirits) which is determined simultaneously with the explained variables and correlated with the error term (Woldridge, 2002). Therefore, we have addressed the issue by including as instrumental variables the probability of consumption of spirits and beer in the lockdown period, and the frequency of consumption in the pre-Covid period⁵. After assessing potential endogeneity in the explanatory variables, econometric practices recommend a stepwise regression approach when using a considerable number of explanatory variables. This process has the advantage of selecting only the statistically significant variables, eliminating non-significant outcomes, thus improving the statistical quality and the reading of the model. We performed a backward selection for the complete ordered probit regressions, with the decision level being significant at 10%.

To assess potential structural differences between countries, we estimated the ordered 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 model. This allowed us to identify structural (partial regression estimated parameters) differences between the country data. Therefore, we proceeded to estimate the ordered probit model, following a stepwise approach for Portugal and Spain separately. In the sequence of this procedure, the model estimated is described in Eq. (8), where a set of explanatory variables, including related psychological factors and consumer characteristics affect the probability of changes in consumption frequency.

$$\begin{aligned} Prob[y = \text{"Lockwine"} = j] = 1 - \Phi(\mu_{j-1} - (\beta_1 Age + \\ \beta_2 D_{Employment} + \beta_3 D_{Urban} + \beta_4 D_{Isolation} + \beta_5 D_{Fear_crisis} + \\ \beta_6 D_{Motiv_taste} + \beta_7 D_{Motiv_health} + \beta_8 D_{Motiv_relax} + \beta_9 D_{Normwine} + \\ \beta_{10} D_{Digital_drink} + \beta_{11} D_{Wine_app} + \beta_{12} D_{Online} + \beta_{13} D_{Wine_stores} + \\ \beta_{14} D_{Private_cellars} + \beta_{15} D_{Supermarkets})). \end{aligned} \quad (8)$$

Variables

Table 1 includes the list of statistically significant variables used in the final econometric models. The

dependent or explained variable is the frequency of wine consumption during the lockdown. Therefore, the "Lockwine" variable is ordinal, with three categories, evaluating potential changes, when compared to the pre-lockdown period (*i.e.*, normal consumption): i) less frequent; ii) as usual; iii) more frequent.

We expect a series of factors to affect wine consumption frequency during the lockdown period.

A group of control variables, including sociodemographic variables, was used. This group includes the age, professional situation and area of residence of the respondent. In order to better understand the results, a comparison between the survey sample results and the population of the countries should be made, as similarities and differences occur due to the sampling technique employed and the results should be understood in accordance with the sample. For example, it is worth mentioning that in both Portugal and Spain, the most populated age group is the 40-49 years segment (18.8% and 19.0% of the adult population) which is also the most represented age group in this sample (29.6% of the respondents). Additionally, it is noteworthy that in our sample, the unemployment rate is 8.3% (4.35% of Spanish respondents and 13.4% of Portuguese respondents), while the national unemployment rate in Spain is 14.1% and in Portugal, it is 6.5%. Moreover, the occupation of the respondents also diverges from that of the national populations. In Portugal and Spain, agricultural workers account for 5.7% and 4.0% of the workforce, while in our sample this rate is higher (19.3% and 15.6% of the respondents).

To explain the model, first, we are interested in the effects of psychological factors related to the pandemic on wine consumption, which are included to analyse how consumers perceive the emerging crisis, the insecurity, and changes to daily life. Crises affect consumer behaviours. Crises spread poverty (Dobrovolskij & Stukas, 2013), increase stress (Mucci *et al.*, 2016) and alter the well-being of populations (Van Hal, 2015). All crises change eating habits (Di Renzo *et al.*, 2020). There is evidence that in the immediate aftermath of a crisis, consumers purchase higher levels of utilitarian products, but there is no evidence of increased consumption of hedonic products (Forbes, 2017). In the case of COVID-19, Bracale & Vaccaro (2020) found an increase in Italians' consumption of some types of food linked with their symbolic value and a tendency to carry on at home certain external socialization habits. Therefore, different responses can be expected depending on the value consumers give to a product, and wine is a good example. Thus, Likert scales measure the "fear of crisis", *i.e.*, the expectations of future economic consequences of the

⁵ The probability of spirits and beer was, respectively, estimated through an ordered probit model (with the dependent variable being the lockdown period consumption frequency and the explanatory variable the frequency of consumption in the pre-Covid period, *i.e.* consumption in normal situations, during the last year, 2019, before Covid). Only the statistically significant variables remain in the analysis.

Table 1. List of variables used in the econometric models

Variable name	Description	Typology
Dependent variable		
Lockwine	Frequency of wine consumption during the lockdown	Ordinal variable (1, less frequent; 2, as usual; 3, more frequent)
Sociodemographic variables		
Age	Age group	Categorical variable (1- From 18 to 29; 2- From 30 to 40; 3- From 41 to 50; 4- From 51 to 60; 5- From 61 to 70; 6- 71 and above)
Employed	Professional situation	Dummy variable (0- unemployed; 1-employed/student/retired)
Urban	Area of residence	Dummy variable (1 – consumer lives in urban area; 0 – otherwise)
Psychological Covid-19 related variables		
Fear_crisis	The measure of the level of fear with Covid-19 crisis (economic consequences)	Likert scale (1- Strongly disagree; 2- disagree; 3- neither agree nor disagree; 4- agree; 5- strongly agree)
Isolation	The measure of the sense of isolation	QCAL scale (5-point Likert scale) unified by a factor analysis which grouped 3 items into one factor.
Psychological motivations of wine consumption variables		
Motiv_taste	Enjoying the taste as a factor of wine consumption	Dummy variable (0- not relevant; 1- relevant)
Motiv_health	Health issues as a driver of wine consumption	Dummy (0- not relevant; 1-relevant)
Motiv_relax	Wine consumption as a factor of relaxation and stress relief	Dummy variable (0- not relevant; 1- relevant)
Consumption characterisation variables		
Norm wine cons	The measure of consumption frequency in the period pre-Covid	Likert scale (1-never; 2-less than once a month; 3- at least once a month; 4-at least once a week; 5- daily)
Digital drink	Engagement in digital social interactions with wine drinking	Dummy variable (0 -no; 1-yes)
Wine app	Use of a smartphone app related to wine	Dummy variable (0- no; 1-yes)
Channels of trade variables		
Online	Use of online channel during the lockdown to buy wine	Dummy variable (0- not used; 1- used)
Wine store	Use of wine stores to buy wine during the lockdown	Dummy variable (0- not used; 1- used)
Private cellars	Use of private cellar to acquire wine during the lockdown	Dummy variable (0- not used; 1- used)
Supermarkets	Use of supermarkets to buy wine during the lockdown	Dummy variable (0- not used; 1- used)

Covid-19 crisis. Additionally, the lockdown fostered a sense of social isolation, which is expected to influence consumer behaviour. To account for this potential effect, the variable “isolation” was included.

The second subgroup, the reason-related variables, comprises a set of variables to assess the three main possible psychological motivations for consuming wine: taste, as wine consumers may prefer the taste of wine compared to other substitute beverages; relaxation and stress relief, to assess the influence on the consumption of wine; and health, which has been a major concern during Covid-19 pandemic (Ruhm & Black, 2002;

Agrawal *et al.*, 2008; Barrena & Sánchez, 2009; Helble & Sato, 2011; Moran & Saliba, 2012; Thach & Chang, 2015, 2016; Chang *et al.*, 2016; Castriota, 2020).

The third subgroup of variables included in this study is that of consumption characterisation. The habit of consuming alcoholic beverages (wine, beer or spirits) is included to assess how pre-lockdown consumption habits influenced changes in the consumption frequency during the lockdown period. A dummy variable for “online” buying is also included. In order to include the new characteristics of consumption, two variables have been incorporated that reflect the impact of technology on the

new consumption patterns. In this way, the digital drink variable explains the new ways of consuming wine based on online social gatherings, given the closure of the HORECA channel. The second variable indicates whether the wine consumer uses a specialised wine app to support his or her consumption decisions.

The fourth group of variables analyses the changes in the trade channel variables due to the closure of the HORECA channel and the limitations to accessing other channels. With specialised wine stores, wineries, cellars and other traditional channels closed, the online channel may have facilitated product availability, thus influencing wine consumption behaviour.

Results

As the results from the likelihood ratio test reveal structural differences between countries [$\text{Chi}^2(12)=2312.79^{***}$], Table 2 includes the final estimation results for Spain and Portugal. The results of the estimations suggest that there are similarities and disparities between Spain and Portugal. It should be noted that the variables that are statistically significant for both countries (Motiv_taste, Motiv_relax, Lock_online,

Normal wine cons, Wine app, Private cellars) have the same direction effect, which allows us to conclude that the changes in consumption patterns are determined by similar factors. Disparities are also identified, with Age and the Level of employment being statistically significant only for Portugal. Meanwhile, the Urban location and Supermarkets and Wine stores are only statistically significant for Spain. And finally, the Digital drinks variable is statistically significant for both countries but with an opposite direction for each country. This appears to be in line with the analysis previously presented.

Given the nature of the estimated model, the ordered probit coefficient results do not provide meaningful interpretations, apart from the significance and direction (sign) of the effects. Thus, we estimated the ordered probit marginal effects to show how wine consumption frequency probabilities change with a variation in the explanatory variables. Table 3 reports the results for the countries analysed, highlighting both differences and similarities between these two markets.

The analysis of the marginal effects allows us to corroborate the argument that the impacts of the determinants of wine consumption changes have similarities for both countries. It is noticeable that the direction of the marginal

Table 2. List of variables used in the econometric models

	Explanatory variable	Spain	Portugal
Sociodemographic variables	Age	-	0.0386* (0.0221)
	Employment	-	0.1684** (0.0777)
	Urban	-0.0969** (0.0470)	-
Psychological Covid-19 related variables	Isolation	-	-
	Motiv_taste	0.1815*** (0.0516)	0.1483** (0.0597)
Psychological motivations of wine consumption variables	Motiv_relax	0.4310*** (0.0584)	0.4710*** (0.0603)
	Normal wine cons	0.0678*** (0.0235)	0.0494* (0.0291)
Consumption characterisation variables	Digital drinks	-0.1381*** (0.0233)	0.3461*** (0.0953)
	Wine app	0.2066*** (0.0584)	0.3757*** (0.0579)
Channels of trade variables	Online	0.2621*** (0.0701)	0.2811*** (0.0811)
	Wine stores	0.3017*** (0.0854)	-
	Private cellars	-0.1905*** (0.0641)	-0.1653*** (0.0599)
	Supermarkets	0.2696*** (0.0541)	-
	Observations	2549	1940
Log-likelihood	-2501.634	-1785.9779	
LR $\text{Chi}^2(7)$	325.03***	237.96***	
Pseudo R^2	0.0610	0.0625	

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. '-' denotes excluded variables from the stepwise approach. LR= likelihood ratio test.

Table 3. Average marginal effects

Explanatory variable	Wine consumption frequency (outcome)	Spain	Portugal	Global (for comparison)
Sociodemographic variables				
Age	Less	ns	-0.0082*	-0.0073**
	As usual	ns	-0.0046*	-0.0031**
	More	ns	0.0128*	0.0104**
Employment	Less	ns	-0.0358**	ns
	As usual	ns	-0.0200**	ns
	More	ns	0.0558**	ns
Urban	Less	0.0246**	ns	ns
	As usual	0.0088**	ns	ns
	More	-0.0334**	ns	ns
Psychological Covid-19 related variables				
Isolation	Less	ns	ns	ns
	As usual	ns	ns	ns
	More	ns	ns	ns
Fear of crisis	Less	ns	ns	ns
	As usual	ns	ns	ns
	More	ns	ns	ns
Psychological motivations to wine consumption variables				
Motiv_taste	Less	-0.0460***	-0.0315**	-0.0392***
	As usual	-0.0165***	-0.0176**	-0.0169***
	More	0.0625***	0.0491**	0.0561***
Motiv_health	Less	ns	ns	ns
	As usual	ns	ns	ns
	More	ns	ns	ns
Motiv_relax	Less	-0.1093***	-0.1002***	-0.1073***
	As usual	-0.0391***	-0.0558***	-0.0462***
	More	0.1484***	0.1600***	0.1534***
Consumption characterization variables				
Normal wine cons	Less	-0.0174***	-0.0105*	-0.0144***
	As usual	-0.0062***	-0.0059*	-0.0062***
	More	0.0237***	0.0164*	0.0206***
Digital drinks	Less	0.0350***	-0.0736***	0.0358***
	As usual	0.0125***	-0.0410***	0.0154***
	More	-0.0475***	0.1146***	-0.0512***
Wine app	Less	-0.0524***	-0.0799***	-0.0665***
	As usual	-0.0187***	-0.0445***	-0.0286***
	More	0.0711***	0.1244***	0.0951***
Channels of trade variables				
Online	Less	-0.0665***	-0.0598***	-0.0674***
	As usual	-0.0238***	-0.0333***	-0.0290***
	More	0.0902***	0.0931***	0.0964***
Wine store	Less	-0.0765***	ns	-0.0536***
	As usual	-0.0273***	ns	-0.0231***
	More	0.1039***	ns	0.0766***
Private cellars	Less	0.0483***	0.0352***	0.0325***
	As usual	0.0173***	0.0196***	0.0140***
	More	-0.0656***	-0.0548***	-0.0466***
Supermarkets	Less	-0.0684***	ns	-0.0445***
	As usual	-0.0244***	ns	-0.0192***
	More	0.0928***	ns	0.0637***

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. ns= not significant

effects remains the same for both countries across all variables, for all outcomes.

The sociodemographic variables considered in this study are age, the consumer's professional situation and the area of residence. The age of consumers is significant for Portugal, and the marginal effects allow us to conclude that older Portuguese consumers tended to be more likely to increase their frequency of wine consumption during the lockdown. Meanwhile, the probability that younger consumers maintained or increased their frequency of consumption during this period was lower.

The marginal effects of employment show that, on average, employed people are more likely than the unemployed to say that their wine frequency stayed constant during the lockdown or increased with the lockdown (in Portugal) and less likely to say their wine consumption decreased. For Portugal, it is possible to conclude that being employed improved the probability of increasing the frequency of consumption.

The place of residence is a statistically significant variable for Spain and the marginal effects allow us to conclude that people residing in urban areas were less likely to increase the frequency of their wine consumption during the lockdown. This is an important point, given the concentration of the population in the urban areas with respect to rural areas.

We were not able to draw any conclusions regarding the effect of the psychological factors included in this study related to feelings of Covid-19, "feeling of isolation" and the "fear of a crisis", as the results suggest that they are not statistically significant in either country. This can be explained by the relatively low frequency of respondents who reduced their frequency of consumption during the lockdown. In addition, it highlights the resilience of wine consumption during the troubled times caused by the lockdown.

The variables included in the estimation related to the psychological motivations for wine consumption display exciting results. The motivations for consuming wine are related to the consumers' loyalty to a product. We can observe that consumers driven by "taste" are more likely to increase the frequency of consumption which highlights the differentiation of wine when compared to other substitute beverages.

The variable Health concerns is not significant for either of the two countries. This is a noteworthy result as within a context of a serious public health crisis, such as Covid-19 and the lockdown situation, health concerns related to the frequency of wine consumption have not been detected. In other words, this issue is not relevant.

The "relaxation" variable as a motivation has the expected result. For both countries, it shows that the higher a consumer values relaxation as a reason to drink wine, the more likely they are to increase the frequency of consumption. This result may have two interpretations.

Wine is a good that generates a feeling of relaxation among consumers and the lockdown experience with social distancing, isolation and feelings of uncertainty drove consumers to increase the search for relaxing factors, such as drinking wine.

For the consumption characterisation variables, the previous consumption behavior Pre-Covid (Normal_wine_cons) produces the expected result. Its impact on consumer behaviour is significant with a positive sign in the same direction for both countries. The analysis of the marginal effects reveals that the higher the frequency of wine consumption in a normal situation, the higher the probability of increasing the frequency of wine consumption during the lockdown. This supports the hypothesis of the loyalty and commitment of wine consumers. This result is in line with the previous analysis of the frequency of consumption which found that the frequency of consumption increased for 34.5% of the respondents, and 48.3% maintain the same wine consumption frequency. The majority of consumers did not increase their frequency since they were already regular/daily consumers.

The lockdown created a new form of social interaction due to the isolation measures, which consisted in digital drinks. This new form of consumption, significant for both countries and with a positive sign, explains how those consumers who organised digital gatherings had a higher probability of increasing their frequency of consuming wine. In any case, it is expected that this is an exceptional situation and related to the lockdown and will not be maintained over time.

Finally, the role played by the specialised wine apps in the increase in the frequency of wine consumption has been noteworthy. Consumers with an app are most likely to have increased their frequency of wine consumption. This is a crucial aspect for establishing promotion and sales strategies for wineries and distributors.

With respect to the channels of trade variables, four different channels have been included, eliminating those corresponding to direct sales, given the restrictions on movement. In this regard, there are differences between the countries. On the one hand, the significance and positive sign for Spain and Portugal is noteworthy as this indicates that the use of the online purchasing channel increases the probability of a higher frequency of wine consumption. However, we can observe that for Spain, this frequency also increased among those consumers who use wine stores and supermarkets. Finally, those consumers with private cellars had a lower probability of increasing their frequency of wine consumption. This is because these consumers have a greater knowledge and appreciation of wine with a regular consumption and their habits were not modified by the pandemic. However, they no longer consumed wine in social gatherings in their own homes which explains why their frequency of consumption decreased.

Discussion

Covid-19 is a very recent phenomenon and we need to analyse its effects in different fields. We know very little about its impacts on alcohol consumption, specifically wine, indicating the need for research on the topic. This study aims to contribute to providing a better understanding of the behaviour of wine consumers during the lockdown, with a focus on the effects of psychological and cultural factors on wine consumption frequency.

The psychological effects of the lockdown on people's consumption behaviour is set to become a growing topic of research. The comparison with the consequences of other natural disasters is useful, but we must also bear in mind that the lockdown has very different characteristics, such as the absence of supply problems and a different perception of its impact on the risk of human lives, since it is not an instantaneous phenomenon but rather one that is prolonged over a long period of time and without the violence characterising other shocks.

In any case, the severity of the impact on lifestyle of disasters such as September 11, 2001, tsunamis or earthquakes is expected to be greater than a period of lockdown. The former imply an extreme risk to life, while in the case of Covid, the effects are related more to feelings or isolation during the lockdown.

Using data from Portugal and Spain, we have estimated an ordered probit model to investigate how wine consumption frequency was influenced by psychological factors and whether there are differences between these two countries. The econometric results and the marginal effects enable us to draw interesting conclusions regarding the impact of the different variables on the variation in the frequency of wine consumption during the lockdown.

With respect to the socio-demographic characteristics, we can observe differences between the countries, which allows us to confirm Hypothesis 2. Age and employment are variables with the expected positive signs with regard to the frequency of wine consumption, but they are only significant for Portugal. Meanwhile, the probability of consumption frequency for Spain reduced in the urban residential areas.

The psychological effects have a double impact. On the one hand, we have shown that although Covid-19 is a public health problem, wine consumers have not experienced feelings of isolation or fear of a crisis that have affected wine consumption. The findings of the analysis show that the psychological effects of the variables that motivate wine consumption are related to hedonic demand functions such as taste or relaxation. The Iberian

lifestyle forms part of the Mediterranean alcohol drinking pattern, and the relevance of health concerns must also be related to lifestyle or the Covid-related fear. This question remains open for future research.

Therefore, we may confirm that the negative psychological factors do not affect the probability of the frequency of wine consumption, rather, this frequency is increased by factors related to the enjoyment of consumption. In this way, Hypothesis 1 is partially supported whereas Hypothesis 2 is partially rejected⁶, as the marginal effects for both countries display similar results regarding significance and magnitude (thus no differences in behaviour are identified). It could be considered that in response to an unprecedented situation that led to a lockdown, the people who drink wine for enjoyment increased their frequency of consumption as a way to deal with an unpleasant situation.

The impact of Covid-19 was probably felt differently in Portugal and Spain (lower mortality rates and different restrictive lockdown measures) but this not seems to influence which is certainly reflected in the different results for wine consumption frequency.

One of the fundamental aspects of this study refers to the validation of the loyalty and commitment of wine consumers. The levels of the frequency of wine consumption prior to Covid-19 are essential for explaining the probability of an increase in consumption frequency. This aspect, together with the confirmation of the motivations for drinking wine identify its consumption frequency with a traditional and hedonistic product. The impact that this profile has on wineries and distributors indicates the need to maintain consumer loyalty, although there is a certain level of "exhaustion" in terms of age segments in the case of Portugal.

The significance of digital drinks and the use of specialised wine apps reveals that the role played by technology in the frequency of consumption cannot be ignored. Future research should study the impacts by age segment and the use of technology. Although it seems that digital drinks could be a temporary wine consuming activity related to the lockdown, the use of specialised apps could be a form of capturing new consumers or lead to a variation in the frequency of wine consumption or other aspects such as the price paid for these purchases.

With respect to the purchasing channels, we should indicate that online purchasing is the channel most used to increase the frequency of wine consumption in both countries, while in the case of Spain the frequency of consumption also increased among those consumers who purchased wine in wine stores and supermarkets. These are two very different channels, so a question that remains open in this

⁶ Regarding structural differences between the coefficients, a likelihood-ratio test was performed with the original model as unrestricted model and a model with constraints imposed to the value of psychological-related coefficients (equaling to the estimated values of the other country) being the restricted model. The results strongly reject the null hypothesis ($\text{Chi}^2(5)=63.72^{***}$), thus confirming structural differences.

respect is the relationship between the frequency of consumption and the average price paid per bottle.

The negative sign of the private cellars should be taken into account as this is negatively related to the increase in the frequency of wine consumption in the case of both countries. A possible explanation is that private cellars are used by the more frequent consumers for social gatherings as well as personal consumption.

Our results can be compared with those of other studies on the impact on wine consumption of other natural disasters or of the same lockdown.

The impacts produced on consumption can vary depending on the kind of disaster. Thus, Foster (2017) reflects on consumption patterns after the 2011 Christchurch earthquake disaster. In this study, the immediate decrease in wine consumption (both red and white) represents around 27% in volume and 22% in value terms. The analysis of the extent of recovery of consumption over a longer period of time (4 weeks), reveals an increase of 10% in volume and an increase of between 6.6% and 10.8% in terms of value. These ratios indicate that short-term recoveries do not offset the post-disaster decline. However, it is necessary to point out that the situation derived from other natural disasters (earthquakes, tsunami, 9/S and others), implied an instantaneous greater vital risk as well as supply problems that have not occurred in the case of Covid-19.

Bracciale & Vacaro (2020) provided an analysis about food consumption in Italy during the Covid-19 emergency. The situation is different depending on the type of drink considered. Thus, it is observed how the consumption of alcoholic beverages (beer and wine) has increased. The greatest increase in wine consumption occurred in Italian wine from a controlled designation of origin (6.6%), Beer (4.1%) and Italian wine from protected geographical indications (2.3%).

Our study has, however, some limitations. The sampling method, the snowball sampling technique, can produce biased results, since the survey sample may be different from the population of interest, namely wine consumers. This may lead to differences between the sociodemographic characteristics of the sample and the population of the countries (and therefore also the population of interest), which can be reflected in the results and their interpretation. As a consequence, our results should be taken with caution as they may not accurately reflect the behaviour of the population of interest.

Future research could complete these results as follows. First, by making a comparison with cross-country differences considered in this article. This could be further expanded with more data. In particular, a comparison with consumption behaviour after the lockdown period would be interesting. Second, future research could go further in terms of the explanatory variables, considering the differences in the price of wine before and during the lockdown. Third, we could exploit different sampling techniques. And, finally, the de-

bate on whether wineries should formulate new strategies in the face of the increase in online shopping should be studied.

Another interesting question is the study of the recovery of wine consumption after lockdown and if there have been changes in wine consumers' profiles or in the purchasing channels, especially as a result of increased online shopping, the implementation of specialised apps and the continuance or not of digital drinks by consumers.

Finally, an aspect to consider in future research is the impact that technology has as a differentiating element in purchasing channels, consumer loyalty or the average purchasing price. The presence of technology will constitute a permanent matter for discussion in the study of the behaviour of wine consumers.

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