Article

Restaurants' Solvency in Portugal during COVID-19

Conceição Gomes , Filipa Campos , Cátia Malheiros and Luís Lima Santos *

CiTUR Centre for Tourism Research, Development and Innovation, Polytechnic University of Leiria,
2411-901 Leiria, Portugal; conceicao.gomes@ipleiria.pt (C.G.); filipa.a.campos@ipleiria.pt (F.C.);
catia.malheiros@ipleiria.pt (C.M.)
* Correspondence: llsantos@ipleiria.pt

Abstract: The main purpose of this study is to understand how Portuguese restaurants' solvency was affected by the COVID-19 pandemic, considering the factors that influence it. Financial information was collected for the years 2019 and 2020 in the SABI database to elaborate a quantitative methodology; a descriptive analysis was used and Pearson's correlation coefficient, a Paired *t*-test, a one-way ANOVA test, and a multiple linear regression were used to test the formulated hypotheses. The findings confirm that solvency is affected by several determinants, such as financial autonomy, indebtedness, financial leverage, asset turnover, return on equity, and long-term bank debt. Solvency is influenced positively by financial autonomy and financial leverage. In contrast, solvency is negatively influenced by indebtedness, asset turnover, and long-term bank debt. Additionally, this paper represents the first study, in the restaurant sector in Portugal, which analyses the importance of solvency and its determinants, by facing a normal year with a crisis year. The paper is innovative in terms of knowledge about restaurant solvency behavior in periods of financial crisis and also because the COVID-19 pandemic has added an additional variable to restaurant solvency: short-term bank debt. In terms of theoretical implications, this study provides further insights about the factors influencing solvency in restaurant businesses during periods of a financial crisis. The main practical contributions are linked to improving the leadership skills of restaurant owners and managers to deal with periods of crisis in general, thus improving the solvency of their businesses and decreasing the risks associated with bankruptcy.

Keywords: solvency; indebtedness; financial autonomy; restaurant industry; COVID-19; regions

1. Introduction

The restaurant industry is one of the most important subsectors of tourism in Portugal and in 2019 it showed net results of 210.2 million € (Bank of Portugal 2023). However, with the appearance of different financial crises over the years (characteristics of modern times), this sector has operated in a financially unstable environment (Israeli 2007). As early as 1991, Tse (1991) stated that restaurants had difficulties developing in such a dynamic environment as the restaurant industry and, as the years go by, it becomes even more difficult for a company to keep its financial sustainability.

The emergence of COVID-19 led to the closure (total or partial) of many restaurants, which led to the decrease of their solvency and even, in some cases, to the bankruptcy of companies (Pacheco et al. 2022). A survey conducted by AHRESP (Association of Hotels, Restaurants and Similar Establishments of Portugal) in early 2022 of catering companies in Portugal shows that more than 30% of companies are considering going into insolvency if they are unable to support all the financial obligations to which they are subjected after the crisis caused by COVID-19; in some companies employees becoming infected by this disease has affected the regular operation of most of the companies working in this sector. An aspect that also undermines the financial situation of almost half of the Portuguese restaurant companies is the delay in government support and the fear that support is not enough to keep the companies operating (AHRESP 2022).

Data from the Bank of Portugal (2023) corroborates with the AHRESP study, as the financial autonomy of Portuguese restaurant companies decreased from 21.9% in 2019 to 17.5% in 2020; perhaps for this reason the financing obtained in the year 2020 (39.3%) rose about 8.6 percentage points compared to the previous year's data (30.7%), and most of the financing obtained in 2020 was through bank loans (67.7%). However, the cost of financing obtained was reduced from 2.4% in 2019 to 1.6% in 2020.

Sales and services provided suffered a drop of EUR 3 million from 2019 to 2020, which was later reflected in the net result of these companies by the Bank of Portugal (2023); one of the causes for the reduction in sales was the partial or total closure of the restaurants (Pacheco et al. 2022). Nevertheless, financial leverage increased from 101.2% to 108.8% during the indicated period by the Bank of Portugal (2023).

To solve the serious economic and financial crisis caused by COVID-19, several measures were implemented such as government support (Díez et al. 2022), reduction in company costs, and increase in credits (Madeira et al. 2021). However, no study, to the authors' knowledge, has related how COVID-19 has influenced the solvency of restaurant companies in Portugal. Thus, the main objective of this study is to understand how Portuguese restaurants' solvency was affected by the COVID-19 pandemic, considering the factors which influence it.

This study will strengthen the research on the restaurant sector and the impact that COVID-19 had on this economic activity, combining different factors/variables that influence solvency; this is considered to be an innovative area for research.

Finally, this study is divided into 5 parts: introduction, which focuses on the importance and contribution of the topic under analysis, the relevance of the analysis of solvency in the restaurant industry and the impact that COVID-19 had on the activity of these companies; theoretical background, where solvency is presented, the impact of COVID-19 on the solvency of restaurant companies and the various determinants that can influence solvency and the research hypotheses are identified; research methodology, where the period and variables analyzed through the Paired T-test, Pearson correlation coefficient, one-way ANOVA test, and multiple linear regression used to obtain the results are explained; findings, which reveals the determinants that influence solvency; conclusions, which summarize the main results of this study, where they can be applied in practice, and how the study contributes to theory and practice. This section also points out limitations and, finally, highlights future research.

2. Theoretical Background

2.1. The Restaurant Sector in Portugal

The restaurant sector in Portugal is typically composed of microsized companies (almost 90% of the supply), and the longevity of these companies is mostly reduced, around 40% of restaurants are active for up to 5 years; however, the oldest companies (above 20 years of activity) have a higher turnover (Bank of Portugal 2023). In terms of location, according to data provided by the Bank of Portugal (2023), companies in the restaurant sector are mostly located in the Metropolitan Area of Lisbon and the Metropolitan Area of Porto, constituting around 50% of the total supply of restaurant companies.

The restaurant industry has unique characteristics and works in a very specific and competitive context (Moser 2002; Opstad et al. 2022). With the impact of crises such as COVID-19, restaurant operation in adverse conditions becomes more difficult, which makes it crucial to understand the behavior of companies in the face of this crisis.

Analyzing relevant information on the companies in the restaurant sector in Portugal and comparing the year 2019 with the year 2020, the number of companies has grown from 35,883 companies to 37,004 companies. The birth rate of these organizations was lower in the year 2020, as was the death rate compared to the year 2019 (Bank of Portugal 2023).

Although the information on the number of companies, the birth rate, and the mortality rate seem positive, comparing 2019 and 2020 when the focus is on the financial data, the

scenario changes. There was a significant reduction in the values of sales and services rendered, and an increase in staff expenses, which is reflected in the increase in bank loans.

Regarding the net result of the Portuguese restaurant companies, in 2019 there was a profit of EUR 210,229; in 2020, there was a loss of EUR 524,198. In 2020, observing the net income of restaurant companies, 65% of the companies reported a negative net income, 21 p.p. more than in 2019. However, years before, such as 2018, 2017, and 2016, had higher percentages of negative net income (resulting from the previous economic crisis in Europe). Regarding the percentage of negative equity, it is perceived that until 2019 the percentage was reduced; however, with the pandemic crisis, in 2020, the percentage increased. The same scenario occurs for the percentage of companies with negative EBITDA and for companies with financial expenses higher than EBITDA (Figure 1).
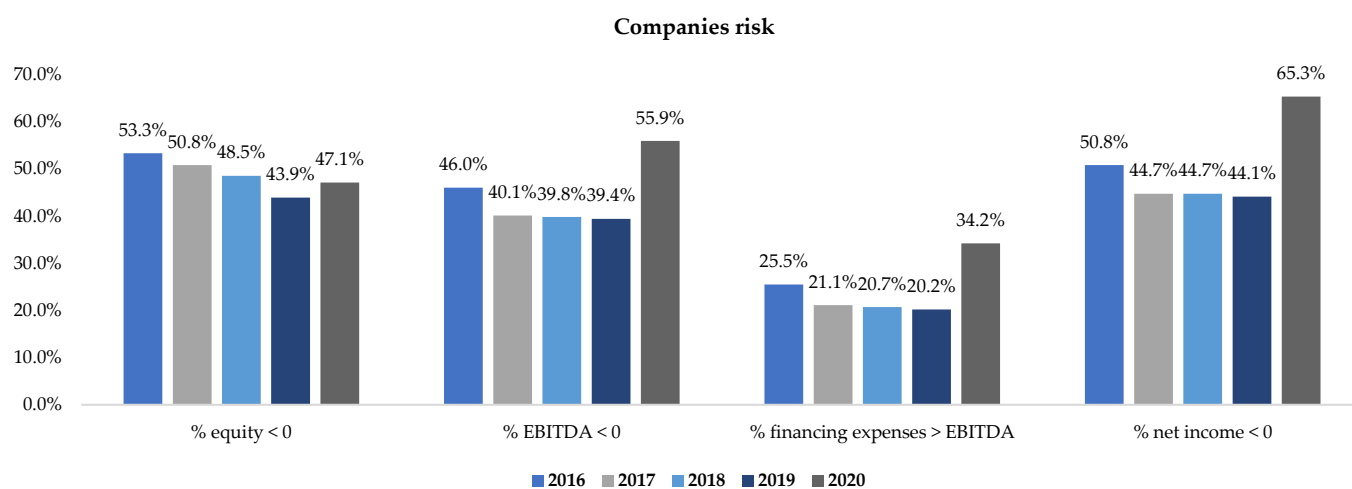

Figure 1. Companies risk—Portugal. Source: Bank of Portugal (2023).

2.2. The Restaurant Sector in Portugal

In broad terms, the term solvency refers to the ability of a company to meet its obligations on time (Yenni et al. 2021). Tsai et al. (2011) state how solvency allows for measurement of the level of access to financing difficulties that may arise in a firm and the flexibility that the company has in obtaining additional debt. Solvency, analyzed over the long term, allows us to assess to what extent an investment in the company may represent a risk to creditors (Megaravalli and Sampagnaro 2019). When companies have trouble fulfilling their obligations, the growth of debt will increase, and this trend will occur in the long term and be reflected in solvency (Naruć 2022). Nevertheless, if companies maintain a low debt level and high equity, they can increase their debt with the future growth objective through debt creation (Tsai et al. 2011). Several studies analyze the importance of solvency in companies in different ways (Crespí-Cladera et al. 2021; Youn and Gu 2009). Yenni et al. (2021) state that the ratio between assets, liabilities, and equity allows us to analyze the degree of solvency of a company in a specific period; considering the ratio between assets and liabilities, the same authors understand that a company is considered solvent if its assets exceed its liabilities to allow growth via reinvestment, which is corroborated by Megaravalli and Sampagnaro (2019) who argue that the higher this ratio is, the more likely it is that companies will achieve greater growth.

Solvency is used in different studies and compared with the profitability and liquidity of companies (Singh and Asress 2010; Youn and Gu 2009; Lucas and Ramires 2022). According to Kitsios and Grigoroudis (2020), the solvency ratio along with asset turnover (sales/total assets) are considered the most important for the financial analysis of a company, because these ratios generate competitive advantages and have an impact on the development of new services; this will allow greater growth and profitability of the business. The solvency ratio also helps in predicting the bankruptcy of companies; the lower the solvency ratio, the higher the debt (Brîndescu-Olariu 2016).

Cultrera and Brédart (2016) agree and state that the bankruptcy of companies is interconnected with liquidity problems, either in the short or medium and long term. Regarding the specific case of restaurants, Camilo (2021) argues that the calculation of the ratio is fundamental to supporting managers' decisions.

The impact of solvency ratios, indebtedness ratios, and profitability ratios are often studied together (Mohammed et al. 2019; Brîndescu-Olariu 2016; Sholaeman et al. 2021; Gomes et al. 2022). The calculation of these ratios helps to improve the financial transparency of companies (Mohammed et al. 2019). Liquidity ratios are also involved in these studies (Mohammed et al. 2019; van Veldhoven et al. 2021).

In this way, and to be able to meet the objective of the study, it is important to include the influence analysis of the indebtedness and profitability ratios in solvency. In fact, financial ratio analysis provides an overview of a company's situation; this insight enables a thorough evaluation of financial performance (Štefko et al. 2021).

Table 1 presents several solvency and indebtedness ratios.

Table 1. Solvency and indebtedness ratios.

Source	Ratios	Formula
Dhaoui (2013)	Global financial autonomy	$\frac{equity}{total\ assets}$
Vasiu and Gheorghe (2014)	Solvency	$\frac{equity}{debt}$
Horobet et al. (2021)	Asset turnover	$\frac{turnover}{asset}$
Lima Santos et al. (2021b)	Financial leverage	$\frac{ROE}{ROA}$
Gomes et al. (2022)	Short-term bank debt	$\frac{short\ term\ bank\ debt}{short\ term\ debt}$
Gomes et al. (2022)	Long-term bank debt	$\frac{long\ term\ bank\ debt}{long\ term\ debt}$
Peterdy (2022)	Indebtedness	$\frac{debt}{total\ assets}$

2.3. The Restaurant Sector in Portugal

Crespí-Cladera et al. (2021) argue that decreasing revenue is the main factor influencing the solvency of companies and can affect not only large but also small companies, damaging employment and increasing the financial difficulties of the sector. The same authors state that a large proportion of companies in financial difficulties will have solvency problems, as total assets are insufficient to pay all debts. Following the crisis generated by COVID-19, several sectors of economic activity saw their solvency affected (Wang et al. 2022; Lin et al. 2022; Crespí-Cladera et al. 2021). Su et al. (2022) corroborate that the pandemic had an impact on financial solvency, as well as the operational and psychological solvency of firms, highlighting the long-term effect that COVID-19 will have at the financial and operational levels, which is corroborated by Pacheco et al. (2022) who stress the importance of both financial and nonfinancial variables in predicting the probability of bankruptcy. However, oppositely, Wang et al. (2022) find the influence of COVID-19 on firms' solvency irrelevant and argue that the pandemic crisis only affected short-term profitability, capital expansion, and market expectations.

The emergence of COVID-19 stimulated the search for answers and led to new studies that analyzed several variables and pointed to different strategies to combat the difficulties that firms in the restaurant industry presented (Freitas and Stedefeldt 2020; Yost et al. 2021; Madeira et al. 2021).

In this context, Madeira et al. (2021) argue that governments should adopt measures that allow for the reduction of operational costs and the introduction of a greater number of credit lines with reduced taxes, especially for small businesses. Díez et al. (2022) reinforce this argument, stating that government support plays an important role in reducing companies' insolvency through capital injection; they also add that the development of internal instruments can help to improve management and overcome crises.

Also, in the sense of solving the problems that the companies faced Crespí-Cladera et al. (2021) suggest analyzing the financial data produced during the previous financial crisis (2007–2008), which generated a major recession, to predict the difficulties that firms may face with the financial crisis generated by COVID-19. To sustain the solvency of the companies, Correia et al. (2022) created a model for the specific case of hotel companies that predicts insolvency, identifying the ratios that allow for regular financial monitoring and control.

The restaurant sector's solution to reduce the impact of COVID-19 is to increase the number of working hours to serve a greater number of meals (Madeira et al. 2021). Freitas and Stedefeldt (2020) indicate solutions at the level of hygiene and food safety, from the reception of the raw material to the sale of the products/meals. Yost et al. (2021, p. 409) agree, stressing the importance of "health, sanitation, safety, and community standards" to inspire customer confidence. The development of takeout menus that ensure these same hygiene and sanitation conditions are considered by Kim et al. (2021) to be a measure that improves revenue and sustainable development for restaurant businesses.

Despite the recommended solutions, Youn and Gu (2009, p. 37) emphasize that by the nature of its activity, "the restaurant industry is vulnerable to recession" and its specific financial characteristics increase the risk of business bankruptcy in this industry (Borde 1998). It is realized then that, with the uncertain situation created by COVID-19, business managers must make particularly complex decisions. These decisions promote the disclosure of information in a more appropriate way (Tibiletti et al. 2021).

To answer the impact of solvency on restaurant companies, the following hypothesis was formulated:

Hypothesis 1 (H1). *Restaurants' solvency is negatively affected by the COVID-19 pandemic.*

2.4. Determinants That Influence Solvency

Solvency can be affected by different determinants that influence the operation of the company.

Youn and Gu (2009) analyzed 14 financial ratios during the period of economic crisis (2006–2008) in the United States of America to assess the financial situation of restaurants. The economic crisis had significant negative impacts in terms of solvency, profitability, liquidity, leverage, and efficiency. As solutions to improve the financial situation of the restaurant sector, the same authors refer to increasing sales and reducing the dependence on debt financing.

Solvency and profitability ratios were also used to analyze the impact that online delivery services had on the financial performance of restaurants (van Veldhoven et al. 2021). The authors examined variables such as collaboration, size, age, and region of the companies. In addition, the risk variable can also affect the profitability of firms and increase the probability of insolvency of restaurant companies (Borde 1998).

Russo et al. (2022) confirm that COVID-19 impact mitigation strategies in restaurants have produced quite positive effects; moreover, according to Madeira et al. (2021), restaurant managers could already know how to deal with adverse financial situations, due to the different crises they previously faced.

Rahman (2017) also related solvency ratios to profitability ratios in his study. According to Gomes and Oliveira (2021), "profitability in turn allows boost growth as well as create stability and robustness in enterprises".

Profitability ratios provide an interpretation of a company's financial situation by assessing various aspects of management, such as income and financial statements for certain periods (Lucas and Ramires 2022; Dimitrić et al. 2019). Table 2 shows various profitability ratios.

Table 2. Profitability ratios.

Source	Ratios	Formula
Lima Santos et al. (2021b)	ROE	$\frac{Net\ income}{equity}$
Sholaeman et al. (2021)	ROA	$\frac{income\ before\ interests\ and\ corporate\ income\ taxes}{total\ assets}$
Gomes and Oliveira (2021)	ROS	$\frac{Net\ income}{turnover}$

Additionally, Tibiletti et al. (2021) claim that the analysis of company performance through solvency and profitability reduces the negative effects caused by COVID-19 and that this kind of analysis had increased in the scientific literature but not in the restaurant industry. To address this research gap, the following hypothesis was developed:

Hypothesis 2 (H2). *Restaurant profitability positively influences solvency.*

Bao and Huang (2021) studied the influence of the COVID-19 pandemic on loans, which have increased. However, the origins of loans differ because, on the one hand, the number of bank loans has remained stable and, on the other hand, loaning companies in the financial services sector have increased greatly. Youn and Gu (2009) argue that debt can arise from decreasing sales, a factor that influences the solvency of restaurants because of the decrease in operating income. Additionally, to meet new liabilities, more debt will be incurred in the form of loans which implies an increase in interest expenses. The same authors state that an increase in the debt ratio can lead to difficulties for full-service restaurant businesses, such as the inability to support operating expenses for an extended period, which can cause serious financial problems in periods of recession. Moreover, in smaller firms, the risk of bankruptcy is higher (Wang et al. 2022). This bankruptcy risk can occur as the financial needs of companies increase and risk their solvency capacity (Vieira 2020). The same author argues that when the solvency ratio increases the contribution to resolve the risk of corporate bankruptcy will be greater. In the same context, in a study conducted in the Iberian Peninsula, Katata (2022) evaluated the determinants that influence the bankruptcy of small and medium-sized firms and concluded that debt affects the solvency of firms, but not significantly. Therefore, the following hypothesis was developed:

Hypothesis 3 (H3). *Restaurant indebtedness negatively influences solvency.*

In the Pacheco et al. (2022) study, solvency is studied along with indebtedness and autonomy; these authors state that financial autonomy indicates the percentage of equity available to finance the firms' activity. Pacheco et al. (2022) affirm that debt and autonomy ratios are negatively correlated because when firms' indebtedness is greater than 100% financial autonomy will indicate strong financial instability and self-financing difficulties, which can potentially jeopardize firms' solvency because the solvency of restaurants is positively affected by autonomy. Consequently, the following hypothesis was developed:

Hypothesis 4 (H4). *Restaurant autonomy positively influences solvency.*

Location affects the variables frequently (Gomes et al. 2022). In several studies, the authors studied how location affected the liquidity of hotels (Lima Santos et al. 2021a); this determinant also affects hotel costs (Touritaa et al. 2019). Additionally, in the study by Gomes et al. (2021) location has a considerable impact on the price of hotel rooms and can affect guest choice. In the study carried out by Crespí-Cladera et al. (2021), geographic location was found to be important in assessing the probability of survival

of hotel businesses, as it can significantly affect the financial sustainability of a business (Parsa et al. 2021). The same is true when analyzing the profitability of a business, location is an important variable (Lado-Sestayo et al. 2017).

Therefore, the following hypothesis was developed:

Hypothesis 5 (H5). *Location influences solvency.*

According to the research carried out by the authors, in a further study, they investigated the impact that solvency ratios have on the restaurant sector in Portugal, which could serve as a starting point for other contexts as well.

3. Research Methodology

The main goal of this research is to analyze how the COVID-19 pandemic has influenced restaurants' solvency as well as solvency's determinants. Then, the period between 2019 and 2020 was chosen for data analysis. These are two distinct periods, one in which historical highs were reached and another in which historical lows were reached. Portugal is a country where tourism has a great impact on the economy to which the restaurant industry has a major contribution.

A quantitative methodology was adopted to obtain the findings of this research, as in the study by Yang and Koh (2022), Galstian et al. (2017), Gomes et al. (2022), and Lucas and Ramires (2022).

In Portugal, the Bank of Portugal is the only entity that provides financial and relevant information on the restaurant sector alone; other entities do so, such as INE or PORDATA, but all data is presented together with the accommodation sector, making the analysis of restaurants difficult. Thus, this study is very important to add more data about the restaurant industry.

Financial data were collected through the Iberian Balance Analysis System (SABI) database on 20 May 2022. The research reached Portuguese restaurant companies, which are assigned the economic activity code 5610, in Portugal by the official document "Código de Atividades Económicas", between the years 2019 and 2020.

Several variables concerning the years 2019 and 2020 were obtained such as region, net income, equity, debt, long-term bank debt, long-term debt, short-term bank debt, short-term debt, total assets, turnover, headcount, income before interests, and corporate income taxes. Subsequently, some ratios were calculated: for example, solvency ratios, profitability ratios, and debt ratios, according to Table 3.

The sample began with 16,958 Portuguese restaurants, but 8041 were eliminated for lack of information, as they assumed negative equity and this made it impossible to calculate ROE. Thus, 8917 Portuguese restaurants were obtained. However, in the sample there were outliers, i.e., aberrant observations that were considered severe, as the values were greater than 3 interquartile ranges below the first quartile or above the third quartile. As the outliers modified the results, the only option was their elimination and a sample with 8684 Portuguese restaurants was obtained. The exclusion of outliers allowed an increase in the average of the following variables: ROE 2020, ROE 2019, ROA 2020, ROA 2019, and ROS 2020; the exclusion also allowed a decrease in the average of the following variables: SOL 2020, SOL 2019, FL 2020, FL 2019, NE 2020, and NE2019. All the remaining variables maintain the average value. Some information with outliers included can be consulted in Gomes et al. (2022).

The Statistics Packages for Social Sciences (SPSS) software (IBM, Armonk, NY, USA) was employed to examine the data to obtain descriptive results and for hypothesis testing. Several authors also used the same software in their study (Brîndescu-Olariu 2016; Javed et al. 2022; Poon and Low 2005; Siddiqi et al. 2022; Zhou et al. 2021).

Table 3. Definition and description of the study variables.

Variable	Formula	Mean	Std Deviation	Maximum	Minimum
ROE 2020	$\dfrac{net\ income}{equity}$	−1.24	6.79	7.29	−162.22
ROE 2019		0.15	2.58	30.77	−5.36
ROA 2020	$\dfrac{income\ before\ interests\ and\ corporate\ income\ taxes}{Total\ assets}$	−0.07	0.31	0.86	−11.73
ROA 2019		0.1	0.26	1.76	−4.12
ROS 2020	$\dfrac{net\ income}{turnover}$	−0.12	0.89	5.40	−31.30
ROS 2019		0.06	0.25	5.03	−4.54
NE 2020	*Number of employees*	9.38	16.05	434	0
NE 2019		11.03	22.30	847	0
SOL 2020	$\dfrac{Equity}{Debt}$	2.71	8.53	162.58	0
SOL 2019		2.79	7.07	106.61	0
AUT 2020	$\dfrac{Equity}{Total\ assets}$	0.43	0.28	1	0
AUT 2019		0.48	0.27	1	0
ID 2020	$\dfrac{Debt}{Total\ assets}$	0.57	0.29	1	0
ID 2019		0.51	0.27	1	0
STBD 2020	$\dfrac{Short\ term\ bank\ debt}{Short\ term\ debt}$	0.1	0.22	1.02	0
STBD 2019		0.07	0.17	1	0
LTBD 2020	$\dfrac{Long\ term\ bank\ debt}{Long\ term\ debt}$	0.7	0.4	1	0
LTBD 2019		0.58	0.44	1	0
AT 2020	$\dfrac{Turnover}{Total\ assets}$	1.55	1.71	63.61	0
AT 2019		2.48	2.34	52.53	0
FL 2020	$\dfrac{ROE}{ROA}$	8.78	37.39	1067.53	−168.87
FL 2019		4.98	16.42	384.45	−26.2

ROE—return on equity; ROA—return on assets; ROS—return on sales; NE—number of employees; ID—indebtedness; STBD—short-term bank debt; LTBD—long-term bank debt; AUT—autonomy; SOL—solvency; AT—asset turnover; FL—financial leverage.

First of all, a Paired T-test was used, where solvency was measured before and after the COVID-19 pandemic to analyze whether COVID-19 affected solvency in restaurants. The null hypothesis was formulated, H0: the mean of the paired differences of solvency equals zero in the sample which should be rejected if the *p*-value is less than 0.05 (Pestana and Gageiro 2014).

Afterward, the Pearson correlation coefficient was applied to find out the variables which have an impact on solvency, individually through the correlation coefficient (Rahman 2017; Chen et al. 2022). Subsequently, the parametric one-way ANOVA was used to test if the restaurant regions have different behaviors according to the regions (Tse 1991). To determine the most disparate regions, multiple comparison tests were used; that is, post hoc tests were applied since they protect against the possible identification of false significant differences between groups. The t-test is not advisable, because pairs of restaurants should be used (Pestana and Gageiro 2014). Then, as the Tukey HSD test is one of the most widely used in practice, is a multiple comparison method, and is most sensitive for finding differences between groups, this test was used (Pestana and Gageiro 2014). Finally, a multiple linear regression model was elaborated to ascertain the variables in a set that can directly influence solvency and to analyze how solvency dependent variables responds according to the independent variables (Borde 1998; Rizwankhurshid 2013; Lin et al. 2022; Lucas and Ramires 2022). The procedure used was stepwise, where variables were included and excluded. Two models were estimated, one for 2019 and one for 2020 to which a diagnostic was performed to analyze homoscedasticity, autocorrelation,

and multicollinearity (Pestana and Gageiro 2014; Wijaya and Muljo 2022). The normality assumption is not necessary to justify the use of linear regression, as "statistical methods rely on the Central Limit Theorem, which states that the average of many independent random variables is approximately normally distributed around the true population mean. It is this Normal distribution of an average that underlies the validity of the t-test and linear regression" (Lumley et al. 2002, p. 152). All these statistical tests were used to test the hypotheses formulated in the literature review.

4. Findings

This study has a sample of 8684 Portuguese restaurants (including mobile food service activities) with an EAC 561 according to the Portuguese EAC Rev.3. Considering the Nomenclature of Territorial Units for Statistics (NUTS) which is divided into three ranks, NUTS 2 was the rank chosen. The restaurants are geographically distributed as Table 4 presents. As one of the hypotheses considers COVID-19 effects, the years surveyed were 2019 and 2020, with the aim of identifying whether COVID-19 influences solvency and its determinants. There were 7791 active restaurants in 2019; 943 restaurants were born and 766 died, closing with 7918 active restaurants in 2020, in this study sample. Then, an increase in the number of restaurants in Portugal was verified despite the COVID-19 pandemic. Data from the Bank of Portugal confirm this fact and note that the birth and death rates of these enterprises are fluctuating (Bank of Portugal 2023).

Table 4. Restaurants by region—Portugal.

Region	Number	Percentage
Alentejo	364	4.2%
Algarve	975	11.2%
Center	1216	14%
Lisbon Metropolitan Area	3408	39.2%
North	2208	25.4%
Autonomous Region of Madeira	357	4.10%
Autonomous Region of Azores	156	1.8%
Total	8684	100%

In Table 4, the sample is presented by region; the Lisbon Metropolitan Area is the region with the largest number of restaurants, followed by the North region.

According to Table 5, the average solvency of restaurants in Portugal decreased between 2019 and 2020. This defines the restaurant's solvency during the COVID-19 pandemic. The situation in Portuguese regions is similar, presenting a drop between 2019 and 2020, except for Algarve and Center where an increase of 1% and 7% were recorded, respectively. The Autonomous Region of Azores (ARA) should be highlighted since it recorded the largest decrease (45%).

Table 5. Solvency by region—Portugal.

Region	2019	2020
Alentejo	4.20	3.72
Algarve	4.70	4.75
Center	2.24	2.40
Lisbon Metropolitan Area	2.79	2.65
North	2.19	2.16
Autonomous Region of Madeira	1.75	1.69
Autonomous Region of Azores	2.63	1.44
Total	2.79	2.71

Based on these results, "H1. Restaurants' solvency is negatively affected by the COVID-19 pandemic" was not rejected for the following regions: Alentejo, Lisbon Metropolitan

Area, North, and Autonomous Region of Madeira. However, this fact should be tested statistically. Then, the Paired T-test was applied. Performing this test produced a *p*-value equal to 0.136, so "H0: the mean of the paired differences of solvency equals zero" was not rejected, and statistically H1 is rejected. So, the COVID-19 pandemic did not affect solvency either negatively or positively; the values are not significantly different.

Through Table 6, the Pearson correlations between the variables were calculated and only significant values were presented. It should be highlighted that the solvency of the previous year positively influences the solvency of the following year, where the highest correlation value is recorded. Subsequently, AUT and ID present a strong influence on solvency, one positive and the other negative, as these ratios are complementary. The higher the autonomy the higher the solvency because autonomy measures the relationship between equity and the asset. Nevertheless, the lower the debt the higher the solvency since indebtedness measures the relationship between debt and the asset. Another moderate correlation is related to LTBD; the lower the debt to the bank in the long term the higher the solvency and vice versa. Observing profitability ratios, the answer is not obvious, as the correlations diverge according to the year. In 2020, ROA and ROE present a weak positive correlation; in 2019, ROS shows a weak negative correlation.

Table 6. Pearson correlation coefficient between variables.

	SOL 2020	SOL 2019
SOL2019	0.637 **	-
STBD	−0.092 **	−0.087 **
LTBD	−0.2 **	−0.207 **
ID	−0.48 **	−0.51 **
AUT	0.48 **	−0.51 **
ROS	-	−0.049 **
ROA	0.037 **	−
ROE	0.056 **	−
NE	−0.065 **	−0.062 **
AT	−0.078 **	−0.091 **
FL	−0.063 **	

** Significance level < 0.01. ROE—return on equity; ROA—return on assets; ROS—return on sales; NE—number of employees; ID—indebtedness; STBD—short−term bank debt; LTBD—long−term bank debt; AUT—autonomy; SOL—solvency; AT—asset turnover; FL—financial leverage.

Therefore, testing "H2. Restaurant profitability positively influences solvency", regarding the previous analysis, the answer is dubious. In 2020, profitability positively influences solvency in a weak way, but, in 2019, the same conclusion is impossible to make.

The "H3. Restaurant indebtedness negatively influences solvency" is not rejected; if indebtedness increases, solvency will decrease. Observing the Pearson correlation coefficient (−0.48 and −0.51) between solvency and indebtedness, there is a strong negative correlation; so, if a restaurant increases its debts there will be solvency problems.

Considering "H4. Restaurant autonomy positively influences solvency", this hypothesis is not rejected; in other words, if autonomy increases, solvency will increase. Regarding the Pearson correlation coefficient (0.48 and 0.51) between solvency and autonomy, there is a strong positive correlation; therefore, when a restaurant increases its autonomy, the solvency ratio will be stronger, decreasing the bankruptcy risk.

Hereafter, to analyze if solvency diverges by location, a one-way analysis of variance (ANOVA) test was performed. Firstly, it was necessary to analyze whether there was homoscedasticity, that is, whether the variances are equal between the groups. In this way, Levene's test was carried out, and the hypothesis null was not rejected ($\rho > 0.05$), due to there being a homogeneity of variances, allowing us to perform the ANOVA.

Thus, restaurants were grouped by NUT II region and solvency was compared to see if solvency differed by region, and the null hypothesis was tested (H0: there is no difference in solvency among region means). Since $\rho < 0.05$, it means that H0 was rejected and, consequently, there is at least one region that is different in terms of solvency. To find out which regions

are different, the t-test is not advisable, because it is necessary to do it in pairs. So, multiple comparison tests were used, and the Tukey HSD test was executed. In 2020, three subgroups were identified with homogeneity of means, while in 2019 two were identified.

According to Table 7, Alentejo and Algarve stand out from the rest with a higher solvency in comparison to the other group which has a lower solvency.

Table 7. Subgroups of regions in 2019.

Highest	Lowest
Alentejo Algarve	Autonomous Region of Madeira Autonomous Region of Azores North Center Lisbon Metropolitan Area

In 2020, (Table 8) Alentejo and Algarve distinguish themselves again verifying the same situation, but a new group has appeared. The Autonomous Region of Madeira and the Autonomous Region of Azores stand out from the others with the lowest solvency.

Table 8. Subgroups of regions in 2020.

Highest	Median	Lowest
Alentejo Algarve	North Center Lisbon Metropolitan Area	Autonomous Region of Madeira Autonomous Region of Azores

Considering all of these results, "H5. Location influences solvency" is not rejected, because the region where the restaurant is located influences solvency.

To consolidate the information and obtain more results, the regression was elaborated to ascertain the variables that can directly influence solvency in a set in the future. Using the F-test, H0 is rejected; that is, all coefficients are different from zero. As the procedure used was stepwise, all the variables that were included in the regression are significant according to the Student t-test. Two linear regressions were obtained, one for each year. Some of the independent variables used in 2019 and 2020 are different, perhaps external circumstances also influence solvency and its determinants, for example, the COVID-19 pandemic.

For the year 2019, the F-test's p-value is less than 0.05, so the coefficients of the regression are different from zero. All the variables presented in Table 9 are significant, according to t-test. There is no autocorrelation as the Durbin–Watson equals 1.995 and there is no multicollinearity according to the collinearity statistics in Table 9.

Table 9. Linear regression of 2019.

	Nonstandardized Coefficients				Collinearity Statistics	
	b	Error	t	Sig	Tolerance	VIF
(Constant)	7.792	0.154	50.638	0.000	-	-
ID	−9.155	0.226	−40.524	0.000	0.759	1.318
FL	0.022	0.003	6.935	<0.001	0.827	1.209
LTBD	−0.890	0.119	−7.507	<0.001	0.887	1.127
AT	−0.179	0.029	−6.272	<0.001	0.926	1.080
ROA	−1.671	0.279	−5.993	<0.001	0.777	1.286
Algarve	0.580	0.155	3.734	<0.001	0.973	1.027
ROE	0.062	0.021	2.984	0.003	0.780	1.282
Alentejo	0.526	0.253	2.077	0.038	0.991	1.009

ROE—return on equity; ROA—return on assets; ID—indebtedness; LTBD—long-term bank debt; SOL—solvency; AT—asset turnover; FL—financial leverage.

According to Table 9, eight independent variables influence solvency; ID has the highest coefficient. If ID increases by 10 p.p., SOL will decrease by 0.9155. In 2019, the location has a fundamental role, as the restaurants in the Alentejo or Algarve will increase solvency. Then, considering Table 7, solvency was obtained in the following model:

$$\text{SOL} = 7.792 - 9.155 \times \text{ID} + 0.022 \times \text{FL} - 0.890 \times \text{LTBD} - 0.179 \times \text{AT} - 1.671 \times \text{ROA} + 0.062 \times \text{ROE} + 0.58 \times \text{Algarve} + 0.526 \times \text{Alentejo}$$

For the year 2020, the F-test's *p*-value is less than 0.05, so the coefficients of the regression are different from zero. All the variables presented in Table 10 are significant, according to t-test. There is no autocorrelation as the Durbin–Watson equals 1.979 and there is no multicollinearity according to the collinearity statistics in Table 10.

Table 10. Linear regression of 2020.

	Nonstandardized Coefficients				Collinearity Statistics	
	b	**Error**	**t**	**Sig**	**Tolerance**	**VIF**
(Constant)	−0.268	0.211	−1.266	0.206	-	-
AUT	8.844	0.259	34.136	<0.001	0.849	1.178
LTBD	−1.369	0.162	−8.451	<0.001	0.890	1.124
AT	−0.355	0.049	−7.234	<0.001	0.932	1.073
ROE	−0.027	0.011	−2.317	0.021	0.579	1.728
STBD	−1.018	0.348	−2.925	0.003	0.979	1.021
FL	0.004	0.002	2.186	0.029	0.575	1.739

AUT—autonomy; LTBD—long-term bank debt; AT—asset turnover; ROE—return on equity; STBD—short-term bank debt; FL—financial leverage.

Regarding Table 10, six independent variables influence solvency; AUT has the highest coefficient. If AUT increases by 10 p.p., SOL will increase by 0.8844. In 2020, the location is not significant. An aspect to consider is the impact of the STBD; after COVID-19 this variable started to influence the solvency. When considering Table 10, solvency was obtained in the following model:

$$\text{SOL} = -0.268 + 8.844 \times \text{AUT} - 1.369 \times \text{LTBD} - 0.0355 \times \text{AT} - 0.027 \times \text{ROE} - 1.018 \times \text{STBD} + 0.004 \times \text{FL}$$

Testing H2, H3, H4, and H5 according to the elaborated regressions, the interpretations are similar. H3 and H4 are not rejected; H2 maintains its doubt. ROE influences SOL positively in 2019 and negatively in 2020. H5 maintains the same answer for 2019, but for 2020 the variable location is not significant in determining solvency through the liner regression.

Lu and White (2014) note that the "robustness check" is important to the validation of the models. Then, robust standard errors were applied as a model diagnostic procedure in order to verify the veracity of the model (King and Roberts 2015). It was applied to both years' regressions and the robust standard errors are similar to the classical standard errors. Thus, the independent variables of the two linear regressions remain the same except for the variable Alentejo in the 2019 regression which is no longer significant. Alentejo is the only variable in which the two types of errors differ.

Summarizing all the results obtained, it is possible to draw Figure 2 to highlight the factors to take into account when improving the restaurants' solvency. The shade of the arrows represents the influence of the variables, with black being stronger and white weaker.
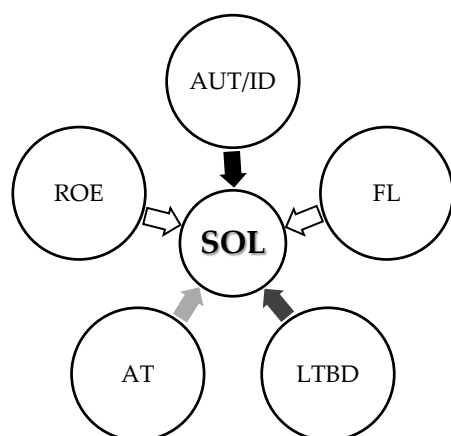
Figure 2. Solvency determinants: ROE—return on equity; AUT—autonomy; ID—indebtedness; FL—financial leverage; LTBD—long-term bank debt; AT—asset turnover; SOL—solvency.

5. Conclusions

Due to the closure of restaurants, of which some changed their service to takeaways, the solvency of these enterprises was disturbed. Aware that solvency aims at the fulfillment of the obligations of firms (Yenni et al. 2021), the main purpose of this study is to understand how Portuguese restaurants' solvency was affected by the COVID-19 pandemic, considering the factors which influence it.

Based on the results, it was possible to test the hypotheses answering the objective of understanding how the solvency of restaurants in Portugal was affected by the COVID-19 pandemic, considering the factors that influence it.

With this study, it was concluded that restaurant solvency decreased with COVID-19 in Portugal (except in Algarve and Center), but this decrease is not statistically significant. Therefore, corroborating Wang et al. (2022), COVID-19 did not impact restaurants' solvency in Portugal. Restaurant solvency is influenced by the solvency of the previous year, long-term bank debt, indebtedness, autonomy, financial leverage, asset turnover, and return on equity in both years. COVID-19 added one variable to influence restaurant solvency: short-term bank debt. Somewhat, COVID-19 moved away some determinants of restaurant solvency: region and return on assets.

In agreement with Crespí-Cladera et al. (2021) and Lado-Sestayo et al. (2017), this study validates that restaurant solvency differs according to region. Algarve and Alentejo present higher solvency. The Autonomous Region of Madeira and the Autonomous Region of Azores present a lower solvency.

All these conclusions allow restaurant managers to understand if solvency was affected by the pandemic crisis, and what the determinants of solvency are. By knowing the determinants, restaurant managers will be able to choose paths that will improve solvency and avoid bankruptcy. These conclusions corroborate the Gomes et al. (2022) study in that managers will be able to access more information and make decisions more robustly regardless of the financial crisis situation. Moreover, an analysis per region allows managers and professionals to compare their company with the industry average per region, improving competitive advantage, which allows a detailed analysis of the future of their business. Another suggestion for future research is to understand if the short longevity of the restaurant companies (5 years) was further affected by the pandemic crisis that dominated for almost 2 years.

Regarding theoretical implications, the study is considered to allow further knowledge about solvency in restaurants in periods of the financial crisis; thus, other studies to test similar hypotheses in other contexts and to extend the research to a larger number of financial indicators might be designed.

The analysis of a single country may represent a limitation, but this can be easily overcome by conducting research in other countries to reinforce the findings of this study and to provide information to the restaurant industry worldwide.

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