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Capital structure adjustments of Hotel SMEs in Portugal's hospitality industry during the COVID-19 pandemic

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ABSTRACT

The COVID-19 pandemic triggered an unprecedented economic shock, disrupting business operations and demand across sectors. This study examines the impact of the COVID-19 pandemic on the capital structure of small and medium-sized enterprises (SMEs) in the Portuguese hotel sector, a core segment of the hospitality industry and one of the most severely affected by the crisis. Using a panel dataset of private hotel firms in Portugal, we find a significant reduction in total debt during the pandemic. Decomposing debt by maturity reveals that firms reduced short-term borrowing while expanding long-term financing, indicating a recomposition of the debt structure during the pandemic. Furthermore, when firms are segmented by size, the reduction in total leverage was concentrated among smaller, financially constrained firms, while the expansion in long-term financing was observed among larger, financially unconstrained firms. A further decomposition of total liabilities into financial and operating components reveals that financial and operating liabilities responded in opposite directions during the pandemic: operating liabilities contracted, while financial liabilities, notably long-term financial debt, increased. This study contributes to the literature on capital structure, corporate finance, and crisis management by providing one of the first empirical assessments of COVID-19's effects on SME financing in a tourism-dependent, bank-reliant economy, a context that remains understudied. It also extends prior research by focusing on private rather than public firms. By examining a highly vulnerable sector, the findings offer insights into financial resilience during crises and provide policy implications for improving liquidity access and strengthening financial stability among tourism-dependent hotel SMEs.

1. Introduction

The aim of this paper is to examine the impact of the COVID−19 pandemic on the capital structure of small and medium-sized enterprises (SMEs) operating within the Portuguese hotel sector, a core segment of the hospitality industry. A firm's capital structure, long a subject of extensive debate in corporate finance (e.g., (Myers, 1977; Bradley et al., 1984; Myers, 1984; Lemmon et al., 2008; Daskalakis et al., 2017), constitutes a core area of inquiry into firms' financing decisions, reflecting how they allocate resources across alternative funding sources under varying internal and external constraints. Over the years, numerous studies have examined how companies strategically combine equity and debt to finance operations efficiently and respond to firm-specific characteristics and market conditions (Titman and Wessels, 1988; Harris and Raviv, 1991; Michaelas et al., 1999).

Grounded in the seminal contribution of Modigliani and Miller (1958), who established the irrelevance of financing decisions under perfect capital markets, this line of research has shown that real-world market imperfections, including bankruptcy costs, agency conflicts, asymmetric information, and tax distortions, give rise to alternative theoretical frameworks. These include, most notably, trade-off theory, pecking order theory, agency theory, and market timing theory, each emphasizing distinct mechanisms that shape firms' capital structure choices (Kraus and Litzenberger, 1973; Myers and Majluf, 1984; Titman and Wessels, 1988; Baker and Wurgler, 2002).

Against this theoretical backdrop, periods of economic instability heighten the importance of capital structure decisions, particularly as firms face increased financial fragility and bankruptcy risk. The

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COVID−19 pandemic offers a compelling illustration of such disruption, having generated an unprecedented global shock that severely constrained business activity across industries and geographies. Firms worldwide experienced revenue declines, liquidity shortages, and pervasive uncertainty (Acharya and Steffen, 2020; Halling et al., 2020; Belitski et al., 2022; Lee et al., 2024; Sharma et al., 2024; Ashraf et al., 2025). In such contexts, firms are compelled to adjust their financing strategies, such as altering their debt positions, renegotiating debt obligations, or relying on cash buffers, in order to cope with immediate financial pressures (Demmou et al., 2021; Ebeke et al., 2021; Nguyen et al., 2023;Bräuning et al., 2024).

Among all firms, SMEs were disproportionately affected. As the backbone of the global business ecosystem, SMEs constitute the vast majority of enterprises, contribute to employment, and account for a significant share of global value added (Daskalakis et al., 2017; D'Amato, 2020; Belitski et al., 2022). Typically operating with limited financial reserves and facing structural barriers to external financing, SMEs are particularly exposed to liquidity shocks and solvency pressures during crises. Their reliance on internally generated cash flows and bank loans, combined with elevated borrowing costs, greater business risks, and high capital requirements, underscores the financial constraints that amplify their vulnerability during systemic stress (Demirgüç-Kunt et al., 2020; Sharma et al., 2024).

Within this context, the tourism and hospitality sectors exemplify the coexistence of operational disruptions, demand-side constraints, and financial fragilities faced by SMEs during the pandemic. Owing to their reliance on social interaction, travel, and international mobility, these industries were among the hardest hit by the crisis. From an operational perspective, lockdown measures directly constrained firms' ability to supply services. From a demand-side perspective, restrictions on travel and mobility limited customers' access to these services, leading to a sharp contraction in demand. These simultaneous shocks resulted in significant revenue losses and prolonged business disruptions (Halling et al., 2020; Sanabria-Díaz et al., 2021; Ebeke et al., 2021; Belitski et al., 2022; Lee et al., 2024; Tascón et al., 2024; Ashraf et al., 2025).

In addition, unlike other industries that mitigated the effects of the crisis by shifting to digital or remote operations, hospitality firms had limited capacity for digital substitution, as their core service offering requires physical presence, travel, and interpersonal contact. The inability to virtualize operations left these firms uniquely exposed to the economic fallout of the pandemic (Halling et al., 2020; Sanabria-Díaz et al., 2021; Belitski et al., 2022; Lee et al., 2024; Tascón et al., 2024; Ashraf et al., 2025).

Although the hospitality industry encompasses a wide range of activities, including accommodation, food services, and tourism-related operations, the present study focuses exclusively on the hotel segment. This distinction is significant because hotel firms differ from other hospitality businesses in their capital intensity and fixed-cost structure. Accordingly, throughout the paper, references to the hospitality industry serve to provide institutional and economic context, whereas the empirical analysis is conducted exclusively on hotel SMEs.

Within the hospitality sector, hotel establishments are most acutely affected by these structural vulnerabilities. Their business model relies on maintaining consistent occupancy levels and entails substantial fixed costs, rendering them highly sensitive to abrupt declines in demand. These pressures were particularly pronounced for smaller, independently owned hotels, which lacked the financial buffers and credit access that larger chains enjoyed. Against this backdrop, Portugal presents a theoretically rich and relevant context for examining how privately held hotel SMEs adjusted their capital structure under the extreme conditions generated by the pandemic.

First, tourism represents a cornerstone of the Portuguese economy, accounting for nearly 20% of GDP and more than one million jobs. Such structural dependence intensified the macroeconomic repercussions of COVID−19, as the collapse in hospitality activity severely affected liquidity, solvency, and overall financial stability. Under these circumstances, capital structure choices became central to firm survival.

Second, the predominance of SMEs, which represent over 99.9% of Portuguese firms, further intensifies these vulnerabilities. SMEs typically operate with constrained internal resources and encounter significant information asymmetries and financing limitations (Michaelas et al., 1999; Jõeveer, 2013; Sharma et al., 2024). Notably, the Portuguese hotel sector consists almost exclusively of privately held firms, indicating that the financial behaviors analyzed in this study pertain to entities without access to public equity markets. Privately held firms generally operate under more constrained financing conditions than their listed counterparts, with restricted access to alternative funding sources and greater dependence on bank credit (Brav, 2009; Moraes et al., 2026). Such characteristics provide a theoretically relevant opportunity to assess whether traditional capital structure theories, which are mainly derived from research on large, publicly listed corporations, hold for privately held SMEs.

Third, the Portuguese economy's heavy reliance on bank credit, coupled with underdeveloped capital markets, limits access to equity and alternative funding instruments (Serrasqueiro and Nunes, 2014). Fourth, from a comparative perspective, Portugal's structural characteristics align closely with those of other Southern European economies such as Greece, Spain, and Italy, where SME dominance, bank dependence, and tourism specialization coexist. Taken together, these features strengthen the external validity of the findings, as insights from the Portuguese case may advance understanding of capital structure dynamics in tourism-intensive, bank-dependent economies more broadly.

During the pandemic, Southern European economies experienced some of the most severe economic contractions in the European Union, reflecting their disproportionate dependence on tourism and services. In Portugal, GDP contracted by approximately 8.2% in 2020, followed by a 5.6% recovery in 2021. The hospitality sector was among the most affected, with international tourism receipts declining by approximately 57.6% in 2020 relative to 2019, before partially recovering in 2021. These cyclical dynamics were broadly shared across the region, with Spain, Italy, and Greece recording similarly severe contractions in 2020, driven by the collapse in international mobility and the protracted disruption to tourism activity. This cyclical context, combined with the structural characteristics discussed above, underscores the analytical relevance of the Portuguese hotel sector and motivates the central research question of the present study:

To what extent did the COVID−19 pandemic influence the capital structure of SMEs in Portugal's hotel sector?

This study contributes to the literature on capital structure, corporate finance, and crisis management in the hospitality industry in several important ways. Prior research has predominantly examined capital structure in the hospitality industry under normal conditions (Sikveland et al., 2022) or the financial consequences of the pandemic for large, listed, or cross-country samples (Nguyen et al., 2023; Tascón et al., 2024; Ashraf et al., 2025), leaving evidence on privately held SMEs within a single, tourism-dependent and bank-based economy limited. Ashraf et al. (2025) explicitly acknowledge a lack of comprehensive understanding of the financing decisions of small and private firms in the hospitality industry, a gap that the present study directly addresses by making the following contributions.

First, it provides firm-level evidence on capital structure adjustments during the COVID−19 pandemic among privately held hotel SMEs. The findings document a significant reduction in total leverage, a recomposition of debt structure with short-term borrowing declining while long-term financing expanded, and heterogeneous responses across firms of different sizes, with the reduction in total debt concentrated among financially constrained firms and the expansion in long-term financing observed among larger, unconstrained firms. Additionally, financial and operating liabilities exhibited opposite responses during the pandemic, with the former increasing while the latter contracted. Second, by focusing exclusively on privately held hotel SMEs, a segment often neglected in empirical research (Brav, 2009; Jõeveer, 2013;

Bräuning et al., 2024), the study identifies firm-specific characteristics that most consistently influence leverage decisions in this context, offering empirical evidence with broader implications for Southern European economies that share similar institutional and sectoral features.

This manuscript is structured as follows. 2 reviews the relevant literature, beginning with the theoretical frameworks underlying capital structure decisions, followed by a synthesis of prior empirical evidence on capital structure in the hospitality industry, and concluding with the development of the research hypotheses in the context of the COVID−19 pandemic. 3 delineates the sample selection, variable definitions, and methodological framework employed in the analysis. 4 presents the empirical results, followed by 5, which offers concluding remarks and highlights the study's contributions.

2. Literature review and hypotheses development

2.1. Theoretical framework

All firms, regardless of size or industry, rely on a combination of equity and debt to finance their operations and investments. This composition, known as a firm's capital structure, constitutes a central element of corporate financial strategy and a key determinant of long-term performance (Myers, 1984; Titman and Wessels, 1988; Harris and Raviv, 1991; Michaelas et al., 1999; Nguyen et al., 2023; Bräuning et al., 2024). Over the past decades, the question of how firms determine their optimal financing mix has remained one of the most debated topics in corporate finance. No single theory fully captures the multitude of factors that shape corporate decisions regarding the balance between debt and equity financing. Given the complexity of these choices, several complementary theories have emerged, each emphasizing distinct mechanisms and assumptions about firm behavior and market conditions (Myers and Majluf, 1984; Harris and Raviv, 1991; Rajan and Zingales, 1995).

The traditional theory of capital structure, first proposed by Durand (1952), posits that each firm has an optimal leverage ratio that minimizes the weighted average cost of capital (WACC) and maximizes market value. Moderate levels of debt can reduce the overall cost of capital, as debt financing is generally cheaper than equity. However, beyond a certain threshold, the marginal increase in financial risk outweighs the benefits of additional borrowing, leading to a rise in the WACC and a decline in firm value.

Challenging this view, Modigliani and Miller (1958) developed a model based on ideal capital markets, arguing that a firm's value is independent of its capital structure. Their first proposition asserts that, in the absence of taxes, bankruptcy costs, and information asymmetries, firm value depends solely on the expected return of its assets, regardless of whether financed through debt or equity. Their second proposition establishes that the expected return on equity increases linearly with leverage, as higher financial risk requires greater compensation. Under these conditions, the increase in equity cost exactly offsets the lower cost of debt, leaving the WACC unchanged. Later, Modigliani and Miller (1963) revised their model to include corporate taxes, acknowledging that tax deductibility of interest payments enhances the attractiveness of debt financing and may raise firm value.

The trade-off theory extends these foundational insights by proposing that firms balance the tax advantages of debt against the potential costs of financial distress. Debt creates a tax shield that enhances firm value, but excessive leverage increases the probability of bankruptcy and financial inflexibility. For SMEs operating in bank-based financial systems, the practical relevance of this framework lies in its emphasis on borrowing costs, default risk, and credit market frictions as the primary determinants of leverage decisions. As the expected cost of financial distress rises with leverage, firms face increasing pressure to reduce debt in order to preserve solvency and maintain access to credit (Kraus and Litzenberger, 1973; Titman and Wessels, 1988).

Beyond this trade-off between tax benefits and bankruptcy costs, capital structure decisions are also shaped by agency conflicts. While agency theory broadly encompasses conflicts between managers and shareholders, the most relevant dimension for SMEs concerns the relationship between shareholders and creditors. In firms where ownership and management coincide, the classical principal–agent problem between managers and shareholders is generally less pronounced. By contrast, as leverage increases, owner-managers may be incentivized to engage in risk-shifting, transferring wealth from creditors to shareholders by replacing safer assets with riskier ones, or to forgo profitable investment opportunities when the gains would primarily accrue to debt holders (the underinvestment problem). These conflicts directly shape both the terms and the availability of external financing, as creditors anticipate such behaviors and respond by tightening lending conditions, requiring collateral, or imposing restrictive covenants (Jensen and Meckling, 1976; Chittenden et al., 1996; Hall et al., 2000; Brav, 2009).

Building on the informational dimension of financing behavior, the pecking order theory (Myers, 1984; Myers and Majluf, 1984) posits a hierarchy of financing preferences driven by information asymmetry. In the context of SMEs, this asymmetry operates primarily between firms and their creditors. Because most SMEs are not publicly traded, the relevant informational frictions are those that affect the firm–lender relationship. Firms are assumed to prefer internally generated funds first and to resort to external debt only when internal resources are insufficient, while equity issuance is largely irrelevant for privately held SMEs. The key implication for SME financing is that information opacity increases the cost and restricts the availability of bank credit, as lenders face difficulties in accurately assessing borrower risk in the absence of publicly verifiable financial information. This adverse selection problem may lead creditors to ration credit, require collateral, or charge higher interest rates, reinforcing the preference for internal finance (Myers and Majluf, 1984; Rajan and Zingales, 1995; Chittenden et al., 1996).

In contrast to the frameworks discussed above, the market timing theory posits that financing decisions are driven by equity market conditions: firms issue equity when market valuations are favorable and resort to debt or repurchases otherwise (Baker and Wurgler, 2002). While this perspective has attracted considerable attention in the broader capital structure literature, its explanatory scope is limited to firms with access to public equity markets. Since the SMEs examined in this study are exclusively privately held and do not issue equity on public equity markets, their financing decisions are governed primarily by credit market conditions, namely interest rates, lending standards, and bank credit availability, rendering this framework of limited relevance to the present context.

Amidst the diverse theoretical perspectives within the capital structure literature, the trade-off and pecking order theories constitute the primary analytical frameworks for understanding SME financing behavior and for deriving testable predictions in the present study. Agency theory, while not independently generating the study's hypotheses, provides essential complementary insights by explaining how conflicts between shareholders and creditors shape lending conditions and constrain SMEs' access to external finance. These mechanisms reinforce the predictions of both the trade-off and pecking order frameworks.

This dual applicability is particularly relevant in the hospitality industry, where the capital-intensive nature of hotel operations creates conditions consistent with both frameworks: high fixed costs reinforce the pecking order preference for internal funds, while substantial tangible assets provide collateral capacity consistent with trade-off predictions (Ashraf et al., 2025). Both predict that when uncertainty and financial distress risks intensify, as during the COVID−19 pandemic, firms reduce their reliance on external borrowing and favor internal sources of finance. These mechanisms collectively establish the conceptual foundation for the empirical analysis and the hypotheses developed in the present study.

2.2. Empirical evidence on capital structure: the hospitality sector and SME literature

Prior empirical work on capital structure in the hospitality industry provides important context for the present study. Under normal operating conditions, Sikveland et al. (2022) document that industry-specific factors, such as tourism seasonality and geographic clustering, significantly shape the maturity composition of debt among private hospitality firms: seasonal demand from foreign tourists increases long-term debt, while geographic clustering increases reliance on short-term borrowing. These findings suggest that standard capital structure theories require augmentation with industry-specific factors to adequately explain financing behavior in the hospitality sector.

Regarding crisis episodes, Lee et al. (2024) show that firm-specific financial characteristics, including leverage and cash holdings, exhibited different levels of resilience during the 2008 financial crisis and the COVID−19 pandemic, with the hospitality industry performing worse operationally during the pandemic than during the 2008 crisis. In the context of COVID−19 specifically, Nguyen et al. (2023) find that hotel firms with lower leverage exhibited greater financial stability during the pandemic, with this benefit more pronounced for smaller, less diversified firms. Ashraf et al. (2025) document that leverage increased among European hospitality firms during the pandemic, with the effect being more pronounced among publicly listed firms, while privately held firms exhibited a relative decline. Tascón et al. (2024) further show that pre-pandemic leverage, profitability, tangibility, and liquidity were key determinants of financial resilience during the crisis among large European hospitality firms.

Beyond the hospitality sector, evidence from the broader SME literature documents that economic crises significantly impact firms' capital structure through both credit supply and demand channels. D'Amato (2020), examining Italian SMEs during the 2008 financial crisis, finds that credit supply shocks reduced SME leverage, particularly short-term debt, and that the pecking order theory provides a better explanation of SME financing behavior than the trade-off theory during crisis periods. Similarly, Demirgüç-Kunt et al. (2020), examining the 2008 global financial crisis across 75 countries, find that deleveraging was particularly pronounced among non-listed SMEs in countries with less developed financial sectors. In the context of COVID−19, Bräuning et al. (2024) document that SMEs with higher pre-pandemic leverage faced tighter credit conditions, consistent with the informational frictions faced by bank-dependent SMEs. Taken together, these findings provide relevant context for understanding the financing behavior of privately held hotel SMEs during the COVID−19 pandemic.

2.3. COVID−19 pandemic and hypotheses development

Pandemics and large-scale health crises have long been recognized as disruptive forces that reconfigure economic activity and firm behavior. Their transformational effects vary in scale but frequently challenge established practices and organizational models. The COVID−19 pandemic, declared a global emergency by the World Health Organization in March 2020, triggered a rapid and widespread economic downturn. Governments worldwide responded with stringent containment measures, including lockdowns, travel restrictions, and business closures (Demmou et al., 2021; Sanabria-Díaz et al., 2021; Wieczorek-Kosmala, 2021; Belitski et al., 2022; Lee et al., 2024; Sharma et al., 2024; Tascón et al., 2024).

Among the sectors most severely affected were tourism, hospitality, and other service industries, which experienced sharp declines in demand and international trade. The hospitality industry faced unprecedented disruption, requiring swift, strategic adaptation from firms (Halling et al., 2020; Ebeke et al., 2021; Wieczorek-Kosmala, 2021; Ashraf et al., 2025). In Portugal, where tourism plays a major role in the national economy, the impact proved particularly severe. Industries closely linked to tourism, such as accommodation, recorded the steepest declines in activity during the first half of 2020. A combination of travel restrictions, contagion fears, and reduced consumer mobility drove the hospitality sector into contraction. Unlike the Subprime Crisis, which primarily suppressed demand, the COVID−19 pandemic directly disrupted business operations, leading to substantial job losses and heightened uncertainty (Halling et al., 2020; Lee et al., 2024; Sharma et al., 2024).

Given the structural characteristics of hotel SMEs discussed above, the pandemic-induced revenue collapse generated acute liquidity shortages that were particularly severe for this segment. Although revenues fell sharply, firms continued to incur substantial fixed cost obligations, while heightened uncertainty further constrained their capacity to finance operations internally (Halling et al., 2020; Wieczorek-Kosmala, 2021; Sharma et al., 2024; Tascón et al., 2024).

Consequently, operating margins deteriorated substantially, in many cases approaching or falling below break-even levels, thereby intensifying liquidity pressures and weakening firms' capacity to internally finance operations. The simultaneous reduction in cash inflows and ongoing financial obligations compelled firms to deplete internal liquidity reserves, increasing their vulnerability to short-term solvency risks. As a consequence, many enterprises experienced operational shutdowns, bankruptcies, and workforce reductions, which produced significant adverse effects on social welfare (Halling et al., 2020; Wieczorek-Kosmala, 2021; Sharma et al., 2024; Bräuning et al., 2024).

Although standard theoretical models predict a tightening of credit conditions in response to increased uncertainty and deteriorating borrower risk profiles, this mechanism was substantially mitigated during the COVID−19 pandemic by government interventions designed to preserve firm liquidity and sustain access to external finance through a combination of financial, fiscal, and labor market measures. In particular, policy instruments such as public guarantee schemes, loan moratoria, tax deferrals, and regulatory forbearance alleviated debt-servicing constraints and supported the continued flow of credit to firms, including in the Portuguese case. These interventions limited the extent to which banks tightened collateral requirements or increased risk premia in line with traditional crisis dynamics (Demmou et al., 2021; Sanabria-Díaz et al., 2021; Tascón et al., 2024).

In the Portuguese context, policy responses combined broad-based liquidity support with sector-specific measures aimed at tourism and hospitality firms, encompassing government-backed credit facilities, moratoria on loan repayments, tax deferrals, wage subsidies, and operational grants directed at the tourism and hospitality sector (Sanabria-Díaz et al., 2021). While such interventions alleviated short-term cash flow pressures and reduced the immediate risk of firm failure, they did not fully offset the sharp deterioration in revenues and the elevated uncertainty faced by firms. As a result, despite improved access to government-guaranteed credit, many SMEs remained reluctant to expand their total debt positions due to heightened uncertainty.

Firms' financial behavior under crisis conditions can be interpreted through the lens of the trade-off and pecking order theories, both of which generate predictions centered on credit market dynamics. According to the trade-off theory (Kraus and Litzenberger, 1973), firms weigh the tax benefits of debt against the expected costs of financial distress. During a systemic crisis such as COVID−19, the probability of default rises sharply, increasing the expected bankruptcy costs associated with additional borrowing. As the perceived risk of insolvency intensifies, the marginal cost of debt financing rises, prompting firms to reduce leverage in order to preserve solvency and financial flexibility.

Complementarily, the pecking order theory (Myers, 1984; Myers and Majluf, 1984) posits that firms follow a financing hierarchy driven by information asymmetry. For SMEs, this asymmetry is most consequential in the firm–lender relationship. During periods of heightened

uncertainty and declining profitability, information opacity intensifies, making it more difficult for creditors to accurately assess borrower creditworthiness. In response, lenders adopt more conservative screening criteria, demand greater collateral, and charge higher risk premia, thereby increasing the cost of bank credit and restricting its availability. Anticipating these constraints, SMEs reduce their reliance on external debt, prioritize internally generated funds, and manage working capital more conservatively, reflecting a precautionary financing strategy driven by the difficulty of accessing affordable credit. Although government interventions partially mitigated these credit supply constraints during the COVID−19 pandemic, as discussed above, informational frictions and firms' precautionary behavior nonetheless reinforced SMEs' preference for internal funds over external borrowing.

When viewed jointly, both theoretical perspectives converge on the prediction that under crisis-induced uncertainty, the costs and risks of additional leverage exceed potential benefits. In the Portuguese context, these mechanisms were further shaped by structural financing constraints and the institutional characteristics of the hotel SME sector, where firms depend largely on bank credit and have limited access to alternative funding sources. Although policy interventions partially sustained credit market functioning, access to external finance remained effectively constrained due to persistent uncertainty and uneven access to support measures. Both frameworks thus provide a theoretical rationale for expecting a reduction in total leverage among Portuguese hotel SMEs during the pandemic, leading to the following hypothesis:

Hypothesis 1. *Ceteris paribus*, the COVID−19 pandemic significantly decreased the level of total debt among SMEs operating in Portugal's hotel sector.

Beyond the effect on total leverage, the composition of debt across maturities warrants separate consideration, as the theoretical mechanisms outlined above generate distinct predictions for short-term and long-term financing. Under the pecking order theory, firms facing heightened uncertainty and deteriorating access to credit are expected to reduce their reliance on short-term borrowing, as the cost of renewing credit lines rises with information opacity and lender risk aversion. During periods of financial stress, the risk of being unable to roll over short-term obligations increases substantially, creating strong incentives for firms to curtail this component of their debt. This mechanism is particularly relevant for privately held SMEs, which face greater informational barriers and more restricted access to credit markets than their listed counterparts (Myers, 1984; Myers and Majluf, 1984; Michaelas et al., 1999; Ozkan, 2001). These considerations lead to the following hypothesis:

Hypothesis 2. *Ceteris paribus*, the COVID−19 pandemic significantly decreased short-term debt among SMEs operating in Portugal's hotel sector.

In contrast to the predicted reduction in short-term borrowing, the theoretical frameworks generate a distinct prediction for long-term debt. Hotel SMEs are characterized by substantial investments in tangible fixed assets, which can serve as collateral and facilitate access to long-term financing even under adverse credit conditions. The trade-off theory predicts that firms with higher asset tangibility are better positioned to sustain or expand long-term debt, as collateral reduces lender risk and mitigates information asymmetry in the firm–lender relationship. Furthermore, during the pandemic, government-supported long-term credit facilities and public guarantee schemes created additional conditions for firms to access or maintain long-term financing, even as short-term credit became more restrictive. These mechanisms provide a theoretical basis for expecting an increase in long-term debt during the pandemic as firms shifted toward more stable, longer-maturity sources of financing (Titman and Wessels, 1988; Harris and Raviv, 1991; Michaelas et al., 1999; Hall et al., 2000), leading to the following hypothesis:

Hypothesis 3. *Ceteris paribus*, the COVID−19 pandemic significantly increased long-term debt among SMEs operating in Portugal's hotel sector.

3. Research methodology

3.1. The sample

The data used for the present study were drawn from the SABI database, which provides detailed financial information on companies operating in Portugal and Spain. The first stage of the sample selection process involved identifying Portuguese firms classified under the CAE code 551, corresponding to hotel establishments within the hospitality industry. The CAE (Classificação das Atividades Económicas) is Portugal's official system for classifying economic activities. Firms that met the SME criteria defined by European Commission Recommendation 2003/361/EC were selected for inclusion. Under these guidelines, SMEs are defined as companies with fewer than 250 employees, an annual turnover of no more than €50 million, or a balance-sheet total of no more than €43 million. To reflect the structural characteristics of the hotel sector, which is predominantly composed of privately owned firms, publicly listed companies were excluded; the sole publicly traded firm in the initial dataset was thus removed.

The study covers the period from 2018 to 2023. After applying the selection criteria, a panel dataset was constructed comprising 2078 firms and 10,257 firm-year observations. The panel is balanced, with all firms observed across the full six-year sample period, ensuring that cross-sectional composition effects do not confound the estimation of within-firm changes in leverage over time. The use of panel data is particularly appropriate in this context, as it can capture firm-level variation over time, especially in response to the COVID−19 crisis.

3.2. Variables

This subsection defines the variables that support the analysis in order to test the hypotheses developed above. All continuous variables are winsorized at the top and bottom one percent of their distributions to mitigate the effects of extreme observations and potential data inaccuracies.

3.2.1. Dependent variables

In this study, leverage serves as the dependent variable, representing a firm's capital structure. Three measures of leverage are employed to capture both the overall level and the maturity composition of firms' debt. The primary measure is total debt, defined as the ratio of total liabilities to total assets. To examine the maturity structure of debt, two additional measures are employed. Short-term debt is defined as the ratio of current liabilities to total assets and encompasses all obligations classified as current in the balance sheet, including short-term bank loans, overdrafts, trade payables, and other current liabilities. Long-term debt is defined as the ratio of non-current liabilities to total assets, encompassing all obligations classified as non-current in the balance sheet, including long-term bank loans and other non-current liabilities. These definitions follow Michaelas et al. (1999). The use of multiple leverage measures is motivated by evidence that the determinants of capital structure may differ across debt maturities, as documented by Michaelas et al. (1999), Ozkan (2001) and D'Amato (2020). Such metrics are particularly suitable for privately held firms, where market-based equity measures are unavailable, necessitating reliance on book-value indicators (Michaelas et al., 1999; Serrasqueiro and Nunes, 2014).

Refer to Table 1 for the operational definitions of the variables.

3.2.2. Variable of interest: COVID−19 dummy

The primary variable of interest in this research is the COVID−19 indicator, which differentiates pandemic years from non-pandemic

Table 1
Variables description.

Variable	Abbreviation	Definition
Total Debt	TDEBT	Total Liabilities/Total Assets
Short-Term Debt	STDEBT	Current Liabilities/Total Assets
Long-Term Debt	LTDEBT	Non-Current Liabilities/Total Assets
Financial Total Debt	FDEBT	Total interest-bearing obligations/Total Assets
Financial Short-Term Debt	FSTDEBT	Short-term financial debt/Total Assets
Financial Long-Term Debt	FLTDEBT	Long-term debt to third parties/Total Assets
Operating Total Debt	ODEBT	Total non-interest-bearing obligations/ Total Assets
Operating Short-Term Debt	OSTDEBT	Other current liabilities/Total Assets
Operating Long-Term Debt	OLTDEBT	Other non-current liabilities/Total Assets
Covid−19 dummy	Covid−19 dummy	An indicator variable equal to 1 for the years 2020 and 2021, 0 otherwise
Asset Tangibility	TANG	Tangible fixed assets/ Total Assets
Growth Opportunities	GROW	The percentage change in total sales from year $t-1$ to year t
Liquidity	LIQ	Current Assets/Current Liabilities
Non-Debt Tax Shields	NDTS	Depreciation/Total Assets
Profitability	PROF	Earnings before interest and taxes/Total Assets
Risk	RISK	Standard deviation of the percentage change in operating income across periods, calculated as the relative difference from year $t-1$ to year t
Size	SIZE	Natural logarithm of Total Assets

Notes: It presents a detailed description of the variables utilized in this study. To minimize the impact of outliers, all continuous variables were winsorized at the 1st and 99th percentiles.

years. It takes the value 1 for the years 2020 and 2021, representing the period most directly affected by the pandemic, and 0 for all other years under analysis (Ashraf et al., 2025).

3.2.3. Control variables

The subsection offers a concise overview of firm-specific factors widely acknowledged in the literature as essential determinants of corporate capital structure.

Asset Tangibility: A higher proportion of fixed assets on a company's balance sheet is generally associated with greater debt capacity, as such assets can serve as collateral, boosting creditors' confidence and facilitating access to external financing. Within the theoretical discourse on capital structure, the trade-off theory posits that firms seek an optimal balance between the tax advantages of debt and the potential costs of financial distress. In this framework, tangible assets play a crucial role, as they can be pledged as collateral, mitigating agency conflicts and reducing lenders' risk exposure. Consequently, a positive association between asset tangibility, computed as the ratio of tangible fixed assets to total assets, and leverage is generally expected (Titman and Wessels, 1988; Harris and Raviv, 1991; Frank and Goyal, 2009; Moraes et al., 2026).

In parallel, the pecking order theory suggests that firms follow a hierarchical financing preference. This prediction is particularly relevant for privately held SMEs, which often operate under severe information asymmetries and limited access to equity. For such firms, tangible assets enhance borrowing capacity and compensate for informational and institutional constraints typical of privately held enterprises, making them more likely to sustain higher leverage ratios (Myers and Majluf, 1984; Sikveland et al., 2022). With respect to debt maturity, tangible assets are expected to be positively associated with long-term debt, as they serve as collateral for longer-maturity financing, while their relationship with short-term debt is expected to be negative, as firms with higher levels of fixed assets tend to rely less on short-term borrowing (Chittenden et al., 1996; Michaelas et al., 1999).

Growth Opportunities: Firms with significant growth potential face higher agency costs due to increased flexibility in investment decisions, which may not always align with stakeholder interests (Titman and Wessels, 1988). Theoretical expectations regarding the relationship between growth opportunities and leverage vary across capital structure theories. Under the pecking order theory, firms with stronger growth prospects are expected to assume more debt when internal funds are insufficient to finance new investments, implying a positive association (Frank and Goyal, 2009).

In contrast, the trade-off theory suggests that firms with substantial growth opportunities may restrict debt usage to avoid the potential costs of financial distress, implying a negative association (Myers, 1977; Titman and Wessels, 1988). Given these contrasting theoretical predictions, no directional prediction is specified. In this study, growth opportunities are measured by the percentage change in total sales (Hall et al., 2000; Moraes et al., 2026).

Liquidity: Liquidity refers to the immediate availability of resources that a company can mobilize to meet its financial obligations. According to the pecking order theory, the likelihood of a firm resorting to debt decreases when it holds a high proportion of liquid assets, as internal financing is generally preferred (Myers, 1984). Ozkan (2001) argues that greater liquidity not only enhances a firm's capacity to meet its obligations and assume debt if necessary but also substantially reduces its dependence on external financing.

Faulkender and Wang (2006) highlight that liquidity is particularly critical for smaller firms, which often face challenges securing external funding and incur higher borrowing costs. In such cases, liquidity acts as a buffer, allowing firms to maintain operations without additional financing expenses. Consequently, while liquidity contributes positively to financial stability and managerial flexibility, it is theoretically expected to be negatively associated with leverage, as more liquid firms typically rely less on debt. With respect to debt maturity, liquidity is expected to be negatively associated with short-term debt, as more liquid firms have less need for short-term borrowing, while its relationship with long-term debt may be positive (Ozkan, 2001). Liquidity was measured using the current ratio, defined as the ratio of current assets to current liabilities, indicating a firm's capacity to meet short-term financial obligations (Ashraf et al., 2025).

Non-debt Tax Shields: Non-debt tax shields, such as depreciation, serve as substitutes for the tax benefits of debt, reducing taxable income without requiring additional borrowing. Such mechanisms allow firms to improve tax efficiency while minimizing exposure to financial distress (Bradley et al., 1984; Serrasqueiro and Nunes, 2014). Consequently, a negative relationship between non-debt tax shields, measured by the ratio of depreciation expense to total assets, and leverage is anticipated under the trade-off theory (Titman and Wessels, 1988; Michaelas et al., 1999; Daskalakis et al., 2017; Sikveland et al., 2022).

Profitability: Profitability is a key determinant of capital structure, reflecting a firm's capacity to generate earnings from its core operations (Myers and Majluf, 1984; Harris and Raviv, 1991; Rajan and Zingales, 1995). Theoretical perspectives diverge regarding the relationship between profitability and leverage. According to the pecking order theory, higher profitability reduces a firm's dependence on external financing, leading to a negative association between the two variables (Myers, 1984; Myers and Majluf, 1984). In the context of SMEs, elevated information asymmetry typically restricts access to external capital. Consequently, such firms rely more heavily on internally generated funds, reinforcing the expectation that profitability is negatively correlated with leverage (Jõeveer, 2013).

In contrast, trade-off theory posits a positive relationship, as more profitable firms are better positioned to exploit the tax advantages of debt (Modigliani and Miller, 1963; Sikveland et al., 2022). To empirically evaluate these competing predictions, profitability is measured using Return on Assets (ROA), calculated as earnings before interest and taxes divided by total assets (Titman and Wessels, 1988; Demirgüç-Kunt et al., 2020).

Risk: Risk represents a condition of heightened uncertainty and competitive pressure that directly influences firms' financing behavior. Firms exposed to greater risk typically experience more volatile cash flows, rendering them more vulnerable during periods of economic instability. As a result, such firms tend to maintain lower levels of debt in their capital structures to mitigate the increased probability of financial distress (Myers, 1984; Serrasqueiro and Nunes, 2014).

SMEs in the hotel sector are particularly exposed to risk due to their limited scale and financial flexibility. Within the hotel sector, these vulnerabilities are intensified by seasonality, macroeconomic fluctuations, and managerial constraints. In line with trade-off theory, leverage is expected to be inversely related to risk. Similarly, pecking order theory predicts a negative association, as heightened risk increases the likelihood of insolvency and raises the cost of external capital (Myers, 1984). Accordingly, a negative relationship between risk, measured as the standard deviation of the year-to-year percentage change in operating income, and leverage is anticipated (Titman and Wessels, 1988).

Size: Firm size is widely acknowledged as a fundamental determinant of capital structure. According to Titman and Wessels (1988), larger firms typically exhibit greater diversification and more stable cash flows, which lowers the probability of bankruptcy. By contrast, smaller firms often encounter greater information asymmetry and higher operational volatility, factors that constrain their ability to secure debt on favorable terms (Serrasqueiro and Nunes, 2014). They also face proportionally higher fixed transaction costs when issuing long-term debt compared to larger firms (Hall et al., 2000). Accordingly, consistent with the trade-off theory and a substantial body of empirical evidence (Michaelas et al., 1999; Hall et al., 2000; Frank and Goyal, 2009; Demirgüç-Kunt et al., 2020), a positive relationship is expected between firm size, measured as the natural logarithm of total assets, and leverage. With respect to debt maturity, the size effect is expected to be more pronounced for long-term debt, as larger firms face lower transaction costs when issuing long-term debt and are better positioned to access longer-maturity financing (Michaelas et al., 1999; Hall et al., 2000).

3.3. Final regression model

Thus, the final panel regression model used in this manuscript is presented in Eq. 1.

$$TDEBT_{i,t} = \beta 0 + \beta_1 Covid19_{i,t} + \beta_2 TANG_{i,t} + \beta_3 GROW_{i,t} + \beta_4 LIQ_{i,t} + \beta_5 NDTS_{i,t} + \beta_6 PROF_{i,t} + \beta_7 RISK_{i,t} + \beta_8 SIZE_{i,t} + \alpha_i + \epsilon_{i,t} \quad (1)$$

Where α denotes firm fixed effects, ϵ represents the error term, and the subscripts i and t correspond to individual firm and year, respectively. All the variables considered in Eq. 1 were previously explained in Table 1. We estimate Eq. 1 separately for each of the three leverage measures, total debt, short-term debt, and long-term debt, as the dependent variable, allowing for a comprehensive assessment of the pandemic's effects on both the overall level and the maturity composition of firms' debt.

When analyzing firms over time, it is essential to adopt an econometric approach that accounts for unobservable heterogeneity. Accordingly, the study employs a firm fixed-effects model to capture characteristics that remain constant across firms and could otherwise bias estimates of capital structure determinants. Such a model, widely applied in corporate finance research, provides a robust framework for examining how time-varying factors influence leverage. By controlling for persistent firm-specific traits, the model enhances the identification of underlying mechanisms that shape capital structure adjustments (Bradley et al., 1984; Demirgüç-Kunt et al., 2020).

In Eq. 1, year-fixed effects are deliberately omitted[1] to preserve statistical identifiability of the COVID−19 indicator and allow unbiased estimation of the effect on firms' total debt, short-term debt, and long-term debt. A binary variable identifies the pandemic years, capturing COVID−19's temporal impact. Including both year-fixed effects and the COVID−19 dummy would produce near-perfect multicollinearity, as the two variables capture overlapping temporal variation. Such multicollinearity would attenuate the estimated coefficient of the COVID−19 dummy and hinder the model's ability to isolate the pandemic's specific effect on leverage. Omitting year-fixed effects also enhances interpretability, ensuring that the coefficient on the COVID−19 dummy reflects the full average treatment effect of the pandemic period rather than being partially absorbed by general year-level shocks.

Prior to estimation, the presence of groupwise heteroskedasticity and first-order serial correlation in the residuals was assessed for all model specifications using the Wald test and the Wooldridge test for serial correlation, respectively. The results confirm the presence of both problems across all specifications, justifying the use of robust standard errors clustered at the firm level.

4. Results

4.1. Descriptive statistics and correlations

Table 2 displays the descriptive statistics for the variables included in the empirical analysis for the sample period from 2018 to 2023. Panel A presents summary statistics for the full sample, reporting the mean, median, standard deviation, and minimum and maximum values for each variable. Panel B presents descriptive statistics disaggregated across three sub-periods, specifically pre-pandemic (2018–2019), pandemic (2020–2021), and post-pandemic (2022–2023), to document how firm-level financial indicators evolved across the different phases of the pandemic cycle. The final dataset comprises 2078 firms, yielding 10,257 firm-year observations.

Turning first to Panel A, the average total debt ratio across the sample is 0.736, with a relatively high standard deviation of 0.890 and a maximum of 7.527, suggesting that some firms operate with high debt levels. Short-term debt accounts for an average of 0.307 of total assets, with a standard deviation of 0.512, while long-term debt presents a slightly higher mean of 0.400 of total assets, with a standard deviation of 0.499. The predominance of long-term over short-term obligations is consistent with the capital-intensive nature of the hotel sector, in which substantial investments in physical infrastructure are typically financed

[1] To further account for macroeconomic conditions not captured by firm fixed effects, we estimated two sets of alternative specifications. First, we augmented the baseline model with macroeconomic control variables introduced individually, including GDP growth, consumer price inflation rate, Euribor 12-month rate, bank credit growth to non-financial corporations, unemployment rate, and travel and tourism exports growth. Second, we estimated specifications including year fixed effects alongside the COVID−19 indicator. Both approaches face identification challenges. In the first approach, since macroeconomic controls vary exclusively across years and overlap substantially with the temporal variation captured by the COVID−19 indicator, their simultaneous inclusion leads to collinearity that undermines the separate identification of their individual effects. In the second approach, the simultaneous inclusion of year fixed effects and the COVID−19 indicator results in perfect multicollinearity, with one year dummy being automatically dropped by the estimation procedure, preventing the separate identification of the COVID−19 effect from general time trends. Despite these identification challenges, the direction and significance of the main findings remain broadly consistent across alternative specifications, providing robustness to the baseline results. All results are available upon request.

Table 2
Descriptive statistics.

Panel A: Full Sample					
Variable	Mean	Median	Stand. Dev.	Min.	Max.
Total Debt	0.7359	0.6057	0.8909	0.0062	7.5276
Short-Term Debt	0.3072	0.1498	0.5115	0.0000	3.9113
Long-Term Debt	0.4003	0.2871	0.4988	0.0000	3.7490
Covid 19 Dummy	0.3397	0.0000	0.4736	0.0000	1.0000
Asset Tangibility	0.5313	0.5882	0.3364	0.0000	0.9914
Growth Opportunities	0.4855	0.1048	2.0142	−1.0000	16.7647
Liquidity	8.0339	1.6077	33.2785	0.0203	384.3194
Non-Debt Tax Shields	0.0421	0.0336	0.0407	0.0000	0.2256
Profitability	0.0120	0.0153	0.2170	−1.4852	0.5873
Risk	8.4209	2.2479	23.1251	0.1309	183.5951
Size	14.2374	14.3284	1.8847	8.5546	18.1029
Panel B: Sub-Period Analysis					
	Pre-Pandemic (2018–2019)			Pandemic (2020–2021)			Post-Pandemic (2022–2023)		
Variable	Mean	Median	Stand. Dev.	Mean	Median	Stand. Dev.	Mean	Median	Stand. Dev.
Total Debt	0.7538	0.6205	0.9121	0.8276	0.6866	0.9949	0.7750	0.6184	0.9913
Short-Term Debt	0.3238	0.1481	0.5378	0.3183	0.1322	0.5615	0.3266	0.1540	0.5474
Long-Term Debt	0.4015	0.2538	0.5371	0.4673	0.3674	0.5505	0.4081	0.2731	0.5383
Asset Tangibility	0.5152	0.5767	0.3569	0.5257	0.5872	0.3517	0.5073	0.5525	0.3469
Growth Opportunities	0.3775	0.0367	2.0665	0.2737	−0.1253	2.0669	0.8491	0.2988	2.0879
Liquidity	12.7186	1.4749	49.4117	12.1472	1.6529	46.9781	9.5049	1.5781	39.9597
Non-Debt Tax Shields	0.0382	0.0274	0.0436	0.0366	0.0267	0.0408	0.0372	0.0297	0.0379
Profitability	0.0180	0.0183	0.2361	−0.0742	−0.0222	0.2503	0.0425	0.0302	0.2175
Risk	8.0672	1.9886	22.9847	9.4056	2.1853	25.3793	9.5657	2.6200	25.0717
Size	13.9178	14.0301	2.0625	14.1004	14.2273	1.9647	14.2800	14.4017	1.9142

Notes: It reports summary statistics of the variables used in this paper. Panel A presents statistics for the full sample. Panel B presents statistics by sub-period: pre-pandemic (2018–2019), pandemic (2020–2021), and post-pandemic (2022–2023). The sample comprises 2078 firms, with 10,257 firm-year observations. The definitions of the variables are provided in Table 1. To minimize the impact of outliers, all continuous variables were winsorized at the 1st and 99th percentiles.

with longer-maturity instruments.

Tangible assets account for an average of 0.531 of total assets, confirming the sector's asset-intensive nature, which requires substantial investment in physical infrastructure to support service provision. Growth opportunities, proxied by the annual percentage change in sales, exhibit substantial dispersion, with a standard deviation of 2.014 and a range of −1.000–16.764. The lower bound reflects a deterioration in revenues for some firms, consistent with the severe demand contraction and mandatory shutdowns observed during the COVID−19 period. In contrast, the positive extreme suggests that a small number of firms were able to sustain or even expand their operations despite the overall sectoral downturn.

The average liquidity ratio of 8.033 indicates that current assets exceed current liabilities by more than eightfold, suggesting a generally positive short-term solvency position. Nevertheless, the standard deviation of 33.278 indicates substantial dispersion in liquidity management policies, likely reflecting differences in firms' access to external financing and in their strategic approaches to cash reserve accumulation during periods of financial stress. Non-debt tax shields present a mean of 0.042, indicating that depreciation expenses represent a relatively small fraction of total assets across the sample.

Profitability exhibits a wide and asymmetric distribution, with a mean of 0.012 and a standard deviation of 0.217, suggesting that, on average, Portuguese hotel firms generated only marginally positive operating returns during the observed period. Such performance is consistent with the structural vulnerabilities of the sector, characterized by high operating leverage, substantial fixed costs, and inherently low operating margins (Ashraf et al., 2025), and reflects the unprecedented revenue suppression caused by COVID−19, which temporarily impaired firms' ability to generate operating cash flows. The risk variable shows a mean of 8.420 and a standard deviation of 23.125, indicating substantial variation in income volatility, consistent with the cyclical and uncertainty-sensitive nature of tourism demand. Firm size averages 14.237 (natural logarithm of total assets), indicating the predominance of small and medium-sized hotel firms in the sample. Finally, the COVID−19 dummy has a mean of 0.339, indicating that approximately one-third of firm-year observations refer to the pandemic period (2020–2021), during which financial and operational dynamics were significantly altered.

Panel B documents the evolution of key financial indicators across the three sub-periods. The average total debt ratio stood at 0.754 in the pre-pandemic period, rose to 0.828 during the pandemic, and then declined to 0.775 in the post-pandemic period. Long-term debt increased notably during the pandemic, rising from a mean of 0.402–0.467, before declining to 0.408 in the post-pandemic period, while short-term debt remained relatively stable across the three sub-periods. Profitability declined sharply during the pandemic, with the mean falling from 0.018 to −0.074, before recovering to 0.043 in the post-pandemic period.

The increase in the sample mean of total debt during the pandemic does not contradict the findings of the regression analysis presented in 4. Since the panel is balanced and all firms are observed throughout the full sample period, sample composition effects do not account for this divergence. Sample means combine both cross-sectional heterogeneity across firms and temporal variation, whereas the fixed effects specification, by removing time-invariant firm characteristics, focuses on within-firm variation and identifies a net reduction in total debt during the pandemic. The aggregate increase in the sample means, therefore, reflects cross-sectional differences in leverage levels across firms rather than within-firm financing adjustments during the pandemic.

Fig. 1 complements Panel B by illustrating the annual evolution of the mean debt ratios by maturity over the full sample period.

Fig. 1 highlights the increase in both total debt and long-term debt during 2020 and 2021, followed by a gradual return toward pre-pandemic levels in 2022 and 2023, alongside the relative stability of short-term debt throughout the period.

In sequence, Table 3 presents the Pearson correlation coefficients among the variables in the model, along with the corresponding Variance Inflation Factors (VIFs), to assess potential multicollinearity.

Correlation coefficients exceeding 0.80 among explanatory variables are generally interpreted as indicative of potential multicollinearity. In this study, all computed correlations remained below this threshold. Among the control variables, the highest correlations are observed between non-debt tax shields and asset tangibility (0.276) and between size and profitability (0.163), both of which are well below the critical threshold. As expected, both short- and long-term debt exhibit strong

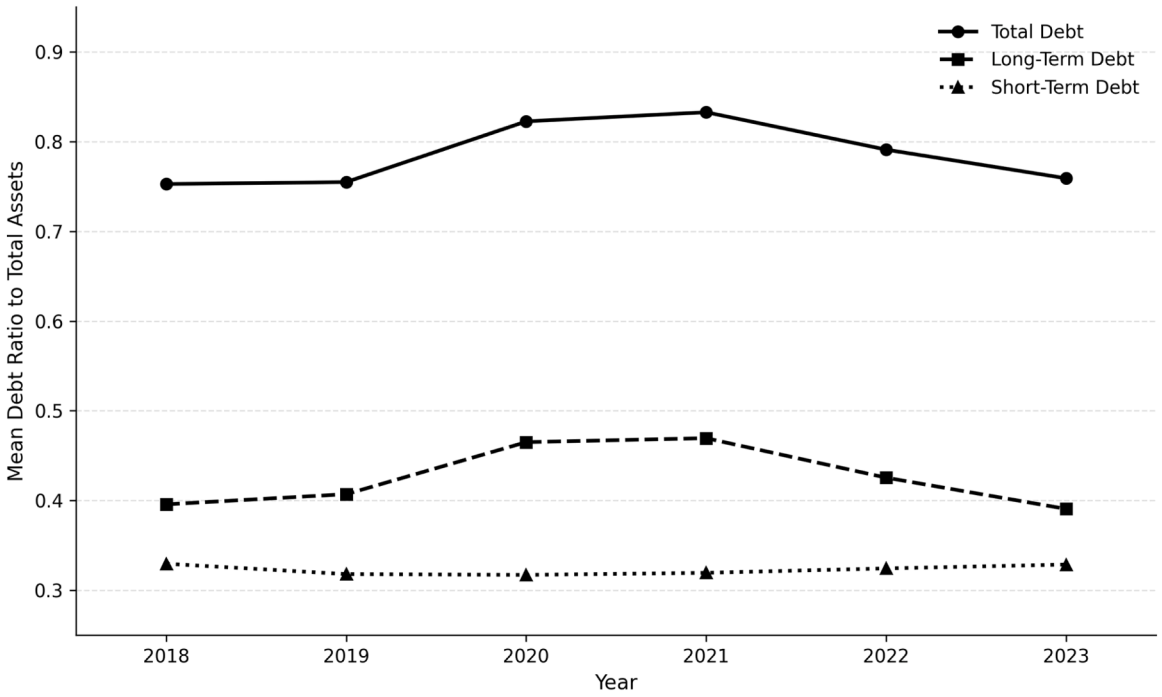

Fig. 1. Evolution of Total, Short-Term, and Long-Term Debt Ratios (2018–2023). Notes: It displays the annual evolution of the mean total debt, short-term debt, and long-term debt ratios for the sample of Portuguese hotel SMEs over the period 2018–2023. Total debt is defined as the ratio of total liabilities to total assets, short-term debt as the ratio of current liabilities to total assets, and long-term debt as the ratio of non-current liabilities to total assets. All continuous variables were winsorized at the 1st and 99th percentiles.

Table 3
Pearson correlation coefficients and the variance inflation factor test.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	VIF
(1) Total Debt	1.000											-
(2) Short-Term Debt	0.703	1.000										1.360
(3) Long-Term Debt	0.654	0.003	1.000									1.150
(4) Covid 19 Dummy	0.036	0.002	0.054	1.000								1.090
(5) Asset Tangibility	−0.064	−0.176	0.119	0.012	1.000							1.250
(6) Growth Opportunities	0.035	0.015	0.042	−0.074	−0.008	1.000						1.020
(7) Liquidity	−0.061	−0.123	0.027	0.023	−0.108	−0.018	1.000					1.050
(8) Non-Debt tax shields	0.054	0.026	0.063	−0.016	0.276	−0.031	−0.085	1.000				1.180
(9) Profitability	−0.462	−0.353	−0.318	−0.265	−0.061	0.073	0.013	−0.096	1.000			1.430
(10) Risk	0.020	0.038	0.008	0.002	−0.041	0.041	0.022	−0.070	−0.002	1.000		1.010
(11) Size	−0.303	−0.338	−0.071	−0.021	0.245	0.046	−0.050	−0.183	0.163	0.049	1.000	1.290

Notes: It reports Pearson correlation coefficients and the VIF test for the variables used in this paper. The definitions of the variables are provided in Table 1.

positive correlations with total leverage (0.703 and 0.654, respectively), as they are components of total debt. Notably, the correlation between short-term and long-term debt is very low (0.003), confirming that the two measures capture distinct dimensions of firms' financing structures. Unreported correlation analyses conducted separately for the pre-pandemic, pandemic, and post-pandemic periods confirm that the correlation structure among the variables remains broadly stable across the three sub-periods, with no substantive changes in the direction or magnitude of the main pairwise associations.

The analysis was further complemented by calculating the Variance Inflation Factor (VIF), which provides a more comprehensive assessment of multicollinearity. All VIF values were well below the conventional cutoff of 10, confirming that multicollinearity is not a concern in the estimated model.

4.2. Fixed effects regression results

Table 4 reports the results of the fixed-effects regression model for the three leverage measures.

The coefficient associated with the COVID−19 dummy variable is negative and statistically significant at the 1% level, indicating that, after controlling for firm fixed effects and firm-specific determinants of leverage, hotel SMEs reduced their total debt during the pandemic relative to non-pandemic years. More precisely, the estimates show that, on average, the ratio of total debt to total assets declined by approximately 2.98 %age points, consistent with the estimated coefficient of −0.0298.

From a theoretical standpoint, the observed reduction in leverage aligns with both pecking-order and trade-off frameworks. Under the pecking-order theory (Myers, 1984; Myers and Majluf, 1984), firms facing heightened uncertainty and greater information asymmetry rely more on internal funds and limit external borrowing. Similarly, trade-off theory predicts that, during systemic shocks, rising expected bankruptcy costs prompt firms to reduce leverage to mitigate financial risk (Kraus and Litzenberger, 1973). Together, these theories suggest that reducing debt constitutes a rational response to elevated uncertainty and higher external financing costs.

The reduction in total leverage documented in the present study

Table 4
Firm fixed effects estimation of Eq. (1).

	Total Debt	Short-Term Debt	Long-Term Debt
Variable	Coefficient	Coefficient	Coefficient
Constant	3.7482***	1.9574***	0.9941***
	(0.1659)	(0.1254)	(0.1286)
Covid 19 Dummy	−0.0298***	−0.0413***	0.0177**
	(0.0070)	(0.0053)	(0.0054)
Asset Tangibility	−0.0550*	−0.1429***	0.1295***
	(0.0310)	(0.0234)	(0.0240)
Growth Opportunities	0.0134***	0.0041**	0.0068***
	(0.0018)	(0.0013)	(0.0014)
Liquidity	−0.0004***	−0.0010***	0.0006***
	(0.0001)	(0.0001)	(0.0001)
Non-Debt tax shields	0.0672	0.0531	−0.0009
	(0.1429)	(0.1078)	(0.1107)
Profitability	−0.6797***	−0.3005***	−0.2824***
	(0.0204)	(0.0154)	(0.0158)
Risk	0.0003	0.0006***	−0.0003*
	(0.0002)	(0.0002)	(0.0002)
Size	−0.2088***	−0.1094***	−0.0471***
	(0.0116)	(0.0087)	(0.0090)
p value	< 0.001	< 0.001	< 0.001
Observations	10,257	10,257	10,257
Wald test (*p* value)	0.000	0.000	0.000
Wooldridge test (*p* value)	0.000	0.000	0.000
Adjusted R^2	0.1890	0.0872	0.0710
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	No	No

Notes: It reports fixed effects estimation explaining the determinants of total debt, short-term debt, and long-term debt in the period 2018–2023. Total debt is defined as the ratio of total liabilities to total assets, short-term debt as the ratio of current liabilities to total assets, and long-term debt as the ratio of non-current liabilities to total assets. Definitions of all other variables are provided in Table 1. The presence of groupwise heteroskedasticity and first-order serial correlation was confirmed using the Wald test and the Wooldridge test for serial correlation, respectively, across all specifications. Robust standard errors are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

contrasts with the overall increase in leverage reported by Ashraf et al. (Ashraf et al., 2025), who examine a broader sample of 94,588 hospitality and tourism-related firms across five industries and 31 European countries over the period 2012–2021. This divergence likely reflects differences in sample composition and scope. While Ashraf et al. (Ashraf et al., 2025) include firms across multiple hospitality sub-sectors and a mix of ownership structures, the present study focuses exclusively on privately held hotel SMEs in Portugal. The observed reduction in total leverage is, however, consistent with D'Amato (2020), who documents a significant decline in leverage among Italian SMEs during the 2008 financial crisis. This finding is also consistent with Demirgüç-Kunt et al. (Demirgüç-Kunt et al., 2020), who document that non-listed firms experienced sharper declines in leverage than listed firms during the 2008 global financial crisis, a pattern they attribute to the inability of non-listed firms to substitute bank financing with capital market financing.

This behavior is particularly intuitive in the hotel industry, where firms operate in an environment characterized by significant revenue volatility due to dependence on domestic and international travel. During the COVID−19 crisis, mobility restrictions sharply reduced occupancy and cash flows, substantially increasing the probability of financial distress. In these circumstances, taking on additional debt would amplify insolvency risk, making a reduction in leverage consistent with deteriorating operating conditions. These pressures were further amplified among the privately held hotel SMEs in the study sample, which exhibit greater financial opacity and structural dependence on bank credit as the primary source of external financing, limiting their capacity to access alternative funding sources under adverse conditions.

Examining the pandemic's effect across debt maturities reveals additional heterogeneity in firms' financing adjustments. The coefficients for the COVID−19 dummy show distinct patterns depending on debt maturity, providing support for Hypotheses 2 and 3. The coefficient for the COVID−19 dummy in the short-term debt model is negative and statistically significant at the 1% level, indicating that firms reduced their reliance on short-term borrowing during the pandemic. More specifically, the ratio of short-term debt to total assets declined by approximately 4.13 %age points, consistent with the estimated coefficient of −0.0413. Conversely, the coefficient in the long-term debt model is positive and statistically significant at the 5% level, indicating that firms expanded their long-term financing during the pandemic. The ratio of long-term debt to total assets increased by approximately 1.77 %age points, reflecting the estimated coefficient of 0.0177.

The overall reduction in total debt reflects the relative magnitude of these opposing adjustments: the decline in short-term borrowing, at approximately 4.13 %age points, more than offsets the expansion in long-term financing of approximately 1.77 %age points, resulting in a net contraction in total liabilities relative to total assets. These findings point to a recomposition of debt structure during the pandemic, with firms reducing short-term borrowing while modestly expanding long-term financing, broadly consistent with evidence documenting a substitution of short-term by long-term debt facilitated by public guarantee schemes during the pandemic (Acharya and Steffen, 2020; Ebeke et al., 2021; Sanabria-Díaz et al., 2021). While D'Amato (2020) finds that both short-term and long-term debt declined among Italian SMEs during the 2008 financial crisis, with short-term debt showing greater sensitivity to credit conditions, the present study documents a distinct pattern in which short-term debt declined while long-term debt expanded.

The expansion in long-term debt is consistent with the trade-off theory prediction that firms with substantial tangible assets retain collateral capacity to access long-term financing even under adverse credit conditions, and that government-supported long-term credit facilities created additional conditions for firms to sustain or expand longer-maturity debt during the pandemic (Kraus and Litzenberger, 1973; Titman and Wessels, 1988). The reduction in short-term borrowing, in turn, is consistent with evidence that short-term external borrowing facilitates periodic monitoring of borrowers and that reducing debt maturity is a tool creditors use to mitigate risk under heightened uncertainty (Ashraf et al., 2025).

Overall, the empirical evidence is consistent with all three research hypotheses. The COVID−19 pandemic significantly reduced total debt among Portuguese hotel SMEs, providing support for Hypothesis 1. The reduction in short-term borrowing is consistent with Hypothesis 2, while the concurrent expansion in long-term financing corroborates Hypothesis 3. Collectively, these results indicate that the pandemic did not produce a uniform contraction in external financing but instead induced a recomposition of debt structure, with firms reducing short-term obligations while accessing longer-maturity instruments.

Turning to the control variables, the results show both consistent and heterogeneous effects across the three models. In the total debt model, non-debt tax shields and risk are not statistically significant. This pattern is consistent across the short-term debt model, where non-debt tax shields also fail to achieve conventional significance levels, and the long-term debt model, where neither non-debt tax shields nor risk achieves conventional significance levels. Such evidence aligns with Titman and Wessels (Titman and Wessels, 1988), who similarly found no significant relationship, suggesting that in SMEs, depreciation-related tax benefits may play a minor role relative to interest deductions, while the risk variable may primarily capture short-term operational volatility rather than long-term solvency risk, thus limiting its relevance for explaining leverage decisions in SMEs (Harris and Raviv, 1991). This finding is further consistent with D'Amato (2020), who also reports an insignificant coefficient for non-debt tax shields in the short-term debt model, attributing this result to the fact that short-term debt in SMEs is largely represented by trade credit, which is unrelated to tax considerations.

Among the control variables that achieve significance in the total debt model, most exhibit negative coefficients. Profitability and liquidity are both negatively and significantly associated with leverage, indicating that more profitable firms and those with higher liquidity levels tend to rely less on external debt. Such evidence supports the pecking order theory (Myers, 1984; Myers and Majluf, 1984; Michaelas et al., 1999), which predicts that firms with higher profitability and liquidity rely more heavily on internally generated funds, reducing their need for external debt financing. At the same time, the observed negative and significant relationship between profitability and leverage contradicts a central proposition of the trade-off theory, which argues that more profitable firms possess greater borrowing capacity and, consequently, should maintain higher debt levels to benefit from the tax advantages of interest deductions (Serrasqueiro and Nunes, 2014).

While conventional theoretical frameworks generally predict positive associations between firm size and asset tangibility and total leverage, both variables present negative coefficients in the total debt model. The inverse relationship between size and leverage may reflect the fact that relatively larger firms within the SME segment tend to have greater financial flexibility and stronger internal financing capacity, reducing their structural reliance on external debt (Rajan and Zingales, 1995; Michaelas et al., 1999), a pattern consistent with evidence documented by Jõeveer (Jõeveer, 2013), who reports negative coefficients for both size and tangibility in broad leverage regressions of privately held firms in Western European countries. Notably, the size effect is more pronounced for short-term debt (−0.1094) than for long-term debt (−0.0471), suggesting that relatively larger firms within the SME segment reduce their short-term borrowing proportionately more than their long-term financing.

Regarding asset tangibility, the negative coefficient in the total debt model, significant at the 10% level, reflects the opposing effects across debt maturities. Asset tangibility is negatively associated with short-term debt at the 1% significance level, suggesting that firms with higher levels of fixed assets rely less on short-term borrowing, while it is positively associated with long-term debt at the 1% significance level. The negative relationship between tangibility and short-term debt and the positive association with long-term debt are consistent with Chittenden et al. (Chittenden et al., 1996) and D'Amato (2020), who document a negative relationship between asset tangibility and short-term debt and a positive association with long-term debt for small firms.

Liquidity shows opposing signs across the two models, being positively associated with long-term debt and negatively associated with short-term debt, indicating that firms with greater liquidity tend to rely less on short-term borrowing. The risk variable exhibits a positive and statistically significant coefficient in the short-term debt model but a negative and weakly significant effect in the long-term debt model, suggesting that higher income volatility is associated with greater short-term financing.

Finally, the positive and statistically significant relationship between growth opportunities and leverage across the total debt, short-term debt, and long-term debt models indicates that firms with stronger investment prospects are more likely to increase borrowing to support expansion, consistent with dynamic interpretations of both the trade-off and pecking order frameworks (Frank and Goyal, 2009), and with evidence that rapidly growing SMEs tend to rely more heavily on debt due to insufficient internal funds and reluctance to issue equity (Michaelas et al., 1999). It is worth noting that sales growth varies considerably across years and sub-periods, and firms experiencing stronger revenue growth may face greater financing needs that cannot be fully met through internal funds, reinforcing reliance on external debt in line with pecking order predictions (Myers, 1984; Frank and Goyal, 2009).

4.3. Robustness tests

In this subsection, we perform several supplementary tests to assess the robustness of our findings.

4.3.1. Constrained and unconstrained companies

The literature on corporate finance consistently highlights financial constraints as a central factor shaping firms' financing behavior. Financially constrained firms typically face limited liquidity, which limits their ability to pursue investment opportunities and heightens exposure to agency costs when raising external capital. Faulkender and Wang (Faulkender and Wang, 2006) argue that larger firms generally benefit from greater visibility and easier access to capital markets, facing fewer barriers in obtaining funds to finance their investments. Conversely, smaller firms tend to encounter more pronounced information asymmetries and higher transaction costs, making external financing both difficult and costly. Such reasoning underpins the widespread use of firm size as a theoretically grounded and empirically validated proxy for financial constraints (Faulkender and Wang, 2006; Manoel et al., 2024).

Financially constrained firms tend to be more vulnerable during periods of crisis (Manoel et al., 2024). Segmenting the sample according to this specification is relevant to the present study. The expected outcome is that the pandemic's impact on leverage will be more pronounced among constrained firms, with these firms being more likely to reduce their debt levels due to their limited financing options.

Incorporating this perspective and following the approaches of Frank and Goyal (Frank and Goyal, 2009) and Manoel et al. (Manoel et al., 2024), the present study conducts a robustness check by categorizing firms as financially constrained or unconstrained based on size. Firm size is measured as the natural logarithm of total assets. For each year in the 2018–2023 period, firms were ranked according to their size and subsequently assigned to quartiles based on their position within the size distribution. Firms in the lowest quartile, representing the bottom 25 %, were classified as financially constrained, whereas those in the highest quartile, representing the top 25 %, were classified as financially unconstrained. Table 5 reports the results.

The results displayed in Table 5 reveal heterogeneous responses to the COVID−19 pandemic across financially constrained and unconstrained firms, with distinct patterns emerging across the three leverage measures. With respect to total debt, the coefficient for constrained firms is negative and statistically significant at the 5% level, indicating that smaller hotel firms significantly reduced their overall leverage during the pandemic. The estimated decline in the ratio of total debt to total assets is approximately 7.26 %age points, consistent with the estimated coefficient of −0.0726, reflecting a substantial contraction in external borrowing. By contrast, the coefficient for unconstrained firms is statistically indistinguishable from zero, suggesting that larger, more financially flexible firms largely maintained their overall capital structures.

Examining the maturity composition of debt reveals additional heterogeneity across groups. For short-term debt, both constrained and unconstrained firms reduced their reliance on short-term borrowing during the pandemic, though the magnitude of the reduction differs substantially between the two groups. Among constrained firms, the estimated decline is approximately 6.76 %age points, consistent with the −0.0676 coefficient, significant at the 1% level. Among unconstrained firms, the reduction is considerably smaller, at approximately 1.57 %age points, consistent with the coefficient of −0.0157, also significant at the 1% level.

For long-term debt, the pattern is reversed. Among constrained firms, the COVID−19 coefficient is positive but statistically insignificant, suggesting no expansion in long-term financing among smaller firms during the pandemic. In contrast, among unconstrained firms, the coefficient is positive and statistically significant at the 5% level, with an estimated increase of approximately 1.66 %age points, consistent with the trade-off theory prediction that firms with stronger financial standing are better positioned to sustain or expand long-term debt even under adverse credit conditions (Titman and Wessels, 1988; Harris and Raviv, 1991).

Taken together, these results indicate that the overall reduction in

Table 5
Firm Fixed Effects Estimation of Eq. (1) with financial constraint criteria.

	Constrained Companies			Unconstrained Companies		
	Total Debt	Short-Term Debt	Long-Term Debt	Total Debt	Short-Term Debt	Long-Term Debt
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Constant	6.9628***	2.7783***	2.4496***	1.2865***	0.5966**	0.6903
	(0.4347)	(0.5897)	(0.7503)	(0.2284)	(0.3032)	(0.6887)
Covid 19 Dummy	−0.0726**	−0.0676***	0.0065	0.0010	−0.0157***	0.0166**
	(0.0296)	(0.0196)	(0.0221)	(0.0050)	(0.0051)	(0.0065)
Asset Tangibility	−0.2907	−0.2179**	0.1036	−0.1404***	−0.0469	−0.1033*
	(0.1098)	(0.1106)	(0.1213)	(0.0270)	(0.0351)	(0.0603)
Growth Opportunities	0.0373***	0.0080	0.0179**	0.0018*	0.0017	0.0001
	(0.0073)	(0.0068)	(0.0069)	(0.0010)	(0.0015)	(0.0018)
Liquidity	−0.0008***	−0.0015***	0.0007**	−0.0003	−0.0017**	0.0014**
	(0.0005)	(0.0003)	(0.0003)	(0.0002)	(0.0007)	(0.0006)
Non-Debt tax shields	0.4524	0.2757	0.0108	0.2095	0.1896	0.0233
	(0.3691)	(0.4208)	(0.3215)	(0.1421)	(0.1762)	(0.1898)
Profitability	−0.6729***	−0.2795***	−0.2551***	−0.4853***	−0.0369	−0.4505***
	(0.0447)	(0.0664)	(0.0708)	(0.0340)	(0.0369)	(0.0514)
Risk	0.0008	0.0004	0.0008	−0.0003	0.0001	−0.0004
	(0.0011)	(0.0009)	(0.0005)	(0.0001)	(0.0001)	(0.0003)
Size	−0.4944***	−0.1843***	−0.1755***	−0.0350**	−0.0232	−0.0128
	(0.0369)	(0.0492)	(0.0633)	(0.0136)	(0.0180)	(0.0411)
p value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Observations	2567	2567	2567	2562	2562	2562
Wald test (*p* value)	0.000	0.000	0.000	0.000	0.000	0.000
Wooldridge test (*p* value)	0.000	0.000	0.000	0.000	0.000	0.000
Adjusted R^2	0.2316	0.0928	0.0877	0.1319	0.0421	0.1113
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No	No

Notes: It presents the results of the fixed effects regressions for subsamples segmented by firm size over the 2018–2023 period. Total debt is defined as the ratio of total liabilities to total assets, short-term debt as the ratio of current liabilities to total assets, and long-term debt as the ratio of non-current liabilities to total assets. Firms were classified as financially constrained or unconstrained based on size, with constrained firms defined as those in the bottom quartile and unconstrained firms as those in the top quartile of the annual size distribution. Definitions of all other variables are provided in Table 1. The presence of groupwise heteroskedasticity and first-order serial correlation was confirmed using the Wald test and the Wooldridge test for serial correlation, respectively, across all specifications. Robust standard errors are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

total debt during the pandemic was driven primarily by financially constrained firms, while the recomposition of debt toward longer maturities was concentrated among unconstrained firms. This pattern underscores the differential capacity of firms to navigate financing constraints during systemic crises, with larger firms exhibiting greater resilience and financial flexibility. These findings provide additional context to the main results, indicating that while Hypothesis 3 is supported in the full sample, the expansion in long-term financing was driven primarily by unconstrained firms, suggesting that firm size is a key moderator of the pandemic's effect on debt maturity composition.

With respect to the control variables, the results show both consistent and heterogeneous patterns across the two groups and the three leverage measures. Profitability remains negatively and statistically significantly associated with total debt and long-term debt across both groups, and with short-term debt among constrained firms, consistent with the pecking order theory. Liquidity is negatively associated with short-term debt for both groups but positively associated with long-term debt among unconstrained firms. Asset tangibility shows a negative association with short-term debt among constrained firms and with total debt among unconstrained firms. Growth opportunities retain a positive and statistically significant association with total debt among constrained firms, but this effect does not extend to unconstrained firms. Firm size remains negatively associated with total debt and short-term debt among constrained firms, consistent with the main regression results.

4.3.2. *Generalized Method of Moments (GMM)*

In the main model of the study, we included firm fixed effects to control for unobserved heterogeneity between firms, which could serve as a potential source of bias. It is well recognized that firm fixed effects models may not fully account for the dynamic nature of capital structure decisions, in which past leverage levels influence current leverage (Lemmon et al., 2008). Moreover, endogeneity remains a persistent concern, as the observed relationships between leverage and firm-specific characteristics may not solely reflect the influence of those characteristics on leverage but may also reflect reverse causality, in which leverage itself affects these firm attributes (Ozkan, 2001). To address these econometric challenges and strengthen the credibility of our inference, we estimate a dynamic panel model using the two-step System GMM estimator developed by Arellano and Bover (Arellano and Bover, 1995) and Blundell and Bond (Blundell and Bond, 1998), which has become a standard approach in empirical corporate finance (Ozkan, 2001; Moraes et al., 2026).

Building on this framework, this estimator is preferred given the potential presence of heteroskedasticity and the robustness of the Hansen test to instrument proliferation. To mitigate the instrument proliferation problem, instruments are collapsed and restricted to lags 2 and 3 of the dependent variable. Eq. 1 is estimated separately for each of the three leverage measures, total debt, short-term debt, and long-term debt, as the dependent variable. Results are presented in Table 6[2].

The results reported in Table 6, estimated using the two-step System GMM estimator, provide further evidence of the robustness of the main findings. The lagged dependent variable is significant at the 1% level across all three models, with coefficients of 0.8820, 0.7329, and 0.6569 for total debt, short-term debt, and long-term debt, respectively. These results confirm strong persistence in firms' capital structure decisions over time, consistent with the dynamic nature of leverage documented in previous studies (Lemmon et al., 2008).

The COVID−19 dummy variable retains its expected sign and statistical significance across all three models. For total debt, the coefficient is −0.0267, significant at the 1% level, confirming that firms significantly reduced overall leverage during the pandemic. For short-term

[2] For conciseness, unreported results indicate that the principal findings on the impact of the COVID−19 variable remain consistent across both the one-step and two-step System GMM specifications.

Table 6
GMM Estimation Results.

	Total Debt	Short-Term Debt	Long-Term Debt
Variable	Coefficient	Coefficient	Coefficient
Constant	0.1587	0.3902***	0.1488**
	(0.1315)	(0.1403)	(0.0595)
Total Debt$_{t-1}$	0.8820***	-	-
	(0.0494)		
Short − TermDebt $_{t-1}$	-	0.7329***	-
		(0.0874)	
Long − TermDebt $_{t-1}$	-	-	0.6569***
			(0.0729)
Covid 19 Dummy	−0.0267***	−0.0484***	0.0177***
	(0.0100)	(0.0069)	(0.0061)
Asset Tangibility	−0.0364***	−0.0652***	0.0635***
	(0.0140)	(0.0202)	(0.0203)
Growth Opportunities	−0.0014	0.0036*	0.0012
	(0.0021)	(0.0019)	(0.0017)
Liquidity	−0.0002***	−0.0009***	0.0005***
	(0.0001)	(0.0001)	(0.0001)
Non-Debt tax shields	0.4838***	0.0574	0.0219
	(0.1829)	(0.1621)	(0.1469)
Profitability	−0.8519***	−0.4416***	−0.3433***
	(0.0755)	(0.0461)	(0.0392)
Risk	0.0000	0.0002	0.0001
	(0.0001)	(0.0001)	(0.0001)
Size	−0.0042	−0.0175**	−0.0042
	(0.0068)	(0.0073)	(0.0033)
p value	< 0.001	< 0.001	< 0.001
Observations	8764	8764	8764
AR (1)	−5.10 [0.000]	−5.46 [0.000]	−6.93 [0.000]
AR (2)	−0.48 [0.635]	1.59 [0.111]	−0.85 [0.393]
Sargan Test	8.36 (2) [0.015]	11.15 (2) [0.004]	1.22 (2) [0.543]
Hansen Test	0.86 (2) [0.649]	1.31 (2) [0.520]	0.13 (2) [0.939]
Year Fixed Effects	No	No	No

Notes: It reports the results from the System GMM estimation explaining the determinants of total debt, short-term debt, and long-term debt over the full sample period (2018–2023). Total debt is defined as the ratio of total liabilities to total assets, short-term debt as the ratio of current liabilities to total assets, and long-term debt as the ratio of non-current liabilities to total assets. Definitions of all variables are provided in Table 1. Robust standard errors are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. AR(1) and AR(2) refer to Arellano-Bond tests for first- and second-order serial correlation. The Sargan and Hansen tests assess the validity of the instruments by testing for overidentifying restrictions, assuming a chi-square distribution. The Sargan test is not robust to heteroskedasticity; the Hansen test is therefore the preferred diagnostic under robust estimation. Degrees of freedom in parentheses and *p* values in brackets.

debt, the coefficient is −0.0484, significant at the 1% level, corroborating Hypothesis 2. For long-term debt, the coefficient is + 0.0177, significant at the 1% level, corroborating Hypothesis 3. Collectively, these results confirm that the pandemic induced a recomposition of debt structure, with firms reducing short-term obligations while expanding long-term financing, consistent with the findings from the fixed-effects models.

Regarding the control variables, the results are broadly consistent with the fixed-effects estimates. Profitability and liquidity retain their statistically significant associations across all three models: profitability is negatively associated with total debt, short-term debt, and long-term debt, and liquidity is negatively associated with total debt and short-term debt, while positively associated with long-term debt. Asset tangibility remains negatively associated with total debt and short-term debt, and positively associated with long-term debt. Firm size maintains a negative, statistically significant association with short-term debt at the 5% level, but this association is not significant for total or long-term debt. Growth opportunities are significant at the 10% level for short-term debt, but are not significant in the other specifications. Notably, non-debt tax shields become statistically significant at the 1% level in the total debt model, though this result should be interpreted with caution, given NDTS's sensitivity to model specification.

Diagnostic tests indicate that all three models are well-specified. The Arellano-Bond tests detect significant first-order autocorrelation in each model, with AR(1) values of −5.10, −5.46, and −6.93 for total debt, short-term debt, and long-term debt, respectively, but no evidence of second-order autocorrelation, with AR(2) values of −0.48, 1.59, and −0.85 and *p* values of 0.635, 0.111, and 0.393. The Sargan tests yield *p* values of 0.015, 0.004, and 0.543 for total debt, short-term debt, and long-term debt, respectively. However, as the Sargan test is not robust to heteroskedasticity, the Hansen test is the preferred diagnostic under robust estimation. The Hansen tests confirm instrument validity across all specifications, with *p* values of 0.649, 0.520, and 0.939. Overall, the System GMM results corroborate the main findings from the fixed-effects models while explicitly accounting for the dynamic nature of leverage and potential endogeneity.

4.4. Additional analysis: financial versus operating liabilities

To further examine the nature of the capital structure adjustments observed during the pandemic, we decompose total liabilities into their financial and operating components. Financial liabilities comprise interest-bearing obligations, including short-term and long-term debt to third parties, while operating liabilities comprise non-interest-bearing obligations, including other current and non-current liabilities. For each component, we estimate separate models for total, short-term, and long-term liabilities, yielding six specifications in total. All other model specifications, including the set of firm-specific control variables, the fixed-effects structure, and the estimation approach, remain identical to those used in Eq. 1. The slightly smaller sample size relative to the baseline results (8249 versus 10,257 observations) reflects the additional data requirements for constructing these measures. Table 7 reports the results.

Regarding financial liabilities, the COVID−19 dummy is positive and statistically significant at the 1% level in both the total and long-term debt models, with estimated increases of approximately 3.02 and 3.69 %age points, respectively. The short-term financial debt model yields a negative and statistically significant coefficient at the 10% level, indicating a reduction of approximately 0.36 %age points. Taken together, these results indicate that hotel SMEs increased their reliance on interest-bearing debt during the pandemic, with the increase concentrated in long-term financial debt, consistent with a shift in the maturity structure of financial liabilities toward longer maturities, in line with the evidence reported in 4.1.

Turning to operating liabilities, the COVID−19 dummy is negative and statistically significant at the 1% level in the total and short-term debt models, with estimated reductions of approximately 4.06 and 2.87 %age points, respectively, and at the 5% level in the long-term debt model, with an estimated reduction of approximately 0.55 %age points. The decline is more pronounced for short-term than for long-term operating liabilities, suggesting a contraction in non-interest-bearing obligations during the pandemic.

These findings provide an important complement to the baseline results. The overall reduction in total liabilities documented in the fixed-effects model appears to be primarily associated with a decline in operating liabilities, while financial liabilities increased over the same period, particularly in their long-term component. Overall, the evidence is consistent with the view that firms adjusted the composition of their liabilities during the pandemic, with a relative decline in operating obligations and an increase in longer-term financial debt.

5. Concluding remarks

Understanding how firms adjust their financing structures during periods of severe economic disruption remains a central issue in corporate finance. Focusing on the Portuguese hotel sector, a capital-intensive and tourism-dependent segment largely composed of privately held SMEs, this study provides firm-level evidence on capital

Table 7
Firm fixed effects estimation: financial and operating liabilities.

	Financial Liabilities			Operating Liabilities		
	Total Debt	Short-Term Debt	Long-Term Debt	Total Debt	Short-Term Debt	Long-Term Debt
Variable	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Constant	0.4657	0.0708	0.2983	2.4808***	1.9310***	0.0146
	(0.2936)	(0.0765)	(0.2616)	(0.5415)	(0.4176)	(0.1314)
Covid−19 Dummy	0.0302***	−0.0036*	0.0369***	−0.0406***	−0.0287***	−0.0055**
	(0.0051)	(0.0022)	(0.0052)	(0.0075)	(0.0058)	(0.0025)
Asset Tangibility	0.0430	0.0153	0.0307	−0.0818*	−0.1100***	0.0495**
	(0.0401)	(0.0171)	(0.0397)	(0.0426)	(0.0340)	(0.0204)
Growth Opportunities	0.0028**	0.0006	0.0027**	0.0047***	0.0023	0.0008
	(0.0011)	(0.0006)	(0.0011)	(0.0014)	(0.0015)	(0.0006)
Liquidity	0.0001	−0.0002***	0.0003**	−0.0005***	−0.0008***	0.0002***
	(0.0001)	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Non-Debt Tax Shields	0.0669	−0.1106	0.1115	−0.0449	0.1355	−0.0634
	(0.1772)	(0.0752)	(0.1637)	(0.3349)	(0.2588)	(0.0914)
Profitability	−0.2168***	−0.0185*	−0.1798***	−0.2992***	−0.1993***	−0.0404***
	(0.0324)	(0.0100)	(0.0317)	(0.0636)	(0.0427)	(0.0143)
Risk	−0.0013***	−0.0003	−0.0007*	0.0007	0.0008	−0.0005
	(0.0005)	(0.0003)	(0.0004)	(0.0007)	(0.0006)	(0.0003)
Size	−0.0090	−0.0014	−0.0014	−0.1450***	−0.1127***	0.0022
	(0.0204)	(0.0054)	(0.0182)	(0.0374)	(0.0287)	(0.0090)
p value	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Observations	8249	8249	8249	8249	8249	8249
Wald test (*p* value)	0.000	0.000	0.000	0.000	0.000	0.000
Wooldridge test (*p* value)	0.000	0.000	0.000	0.000	0.000	0.000
Adjusted R^2	0.0919	0.0056	0.0718	0.0923	0.0802	0.0138
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	No	No	No	No	No

Notes: Table 7 reports fixed effects estimation explaining the determinants of financial and operating liabilities in the period 2018–2023. Financial total debt is defined as the ratio of total interest-bearing obligations to total assets, financial short-term debt as the ratio of short-term financial debt to total assets, and financial long-term debt as the ratio of long-term debt to third parties to total assets. Operating total debt is defined as the ratio of total non-interest-bearing obligations to total assets, operating short-term debt as the ratio of other current liabilities to total assets, and operating long-term debt as the ratio of other non-current liabilities to total assets. Definitions of all other variables are provided in Table 1. The presence of groupwise heteroskedasticity and first-order serial correlation was confirmed using the Wald test and the Wooldridge test for serial correlation, respectively, across all specifications. Robust standard errors are reported in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively.

structure adjustments during the COVID−19 pandemic, a context that has received limited attention in the existing literature.

After controlling for firm-specific characteristics and firm-fixed effects, the empirical findings reveal a robust and statistically significant reduction in total debt during the pandemic. While this finding contrasts with the overall increase in leverage documented among a broader sample of European hospitality firms (Ashraf et al., 2025), it is consistent with evidence that non-listed SMEs experienced sharper declines in leverage during the 2008 global financial crisis (Demirgüç-Kunt et al., 2020; D'Amato, 2020). Decomposing this result by debt maturity reveals that firms reduced short-term borrowing while expanding long-term financing, broadly consistent with evidence documenting a substitution of short-term by long-term debt during the pandemic (Acharya and Steffen, 2020; Ebeke et al., 2021; Sanabria-Díaz et al., 2021).

Further analysis shows that the reduction in total debt was particularly pronounced among financially constrained firms, while the expansion in long-term financing was observed exclusively among larger, financially unconstrained firms, highlighting the differential capacity of firms to navigate financing constraints during systemic crises. A further decomposition of total liabilities into financial and operating components reveals that the aggregate reduction in total liabilities is associated with a contraction in operating liabilities, while financial liabilities, particularly long-term financial debt, increased during the pandemic, consistent with a recomposition of firms' liability structure during the crisis.

From a theoretical perspective, this study contributes to the capital structure literature by providing evidence that pecking order and trade-off mechanisms may operate simultaneously during periods of severe economic disruption. The observed reduction in total leverage is consistent with the pecking order prediction that firms under heightened uncertainty prioritize internal funds and limit external borrowing. At the same time, the concurrent expansion in long-term financing is consistent with the trade-off prediction that firms adjust their debt maturity structure to balance financial distress costs and tax benefits.

Furthermore, the heterogeneous responses across firm size groups suggest that the degree of financial constraint moderates the capital structure adjustments observed during the pandemic, with constrained firms exhibiting a more pronounced reduction in total debt and unconstrained firms being the primary drivers of the expansion in long-term financing. The research also offers fresh empirical insights into the determinants of leverage among privately owned SMEs, thereby addressing an underexplored segment of the corporate finance literature.

These findings are, to the best of our knowledge, among the first firm-level evidence on capital structure adjustments among privately held hotel SMEs in a single-country, tourism-dependent, and bank-based economy, and are corroborated by a System GMM estimator, which accounts for capital structure persistence and potential endogeneity.

The results carry significant policy implications. In the Portuguese hospitality sector, particularly among hotel SMEs, financing needs and debt capacities fluctuate in response to systemic shocks, sector-specific vulnerabilities, and broader economic conditions. The observed recomposition of debt toward longer maturities underscores the importance of access to longer-maturity financing as a dimension of financial resilience during systemic crises. Policymakers and financial institutions should therefore design targeted interventions and lending policies that are both timely and calibrated to sectoral particularities. The evidence that the expansion in long-term financing was concentrated among financially unconstrained firms, while constrained firms did not exhibit a statistically significant increase in long-term debt, suggests that policy support mechanisms directed at smaller hotel SMEs

may play an important role in broadening access to longer-maturity financing during future crises, thereby strengthening the sector's overall financial resilience.

A full interpretation of the evidence requires acknowledging several limitations. First, the relatively short temporal horizon may not fully capture the long-term ramifications of the COVID−19 pandemic. Second, the SABI database, from which the sample was drawn, does not provide firm-level information on access to government support programs, including loan guarantee schemes, moratoria, and direct subsidies. This data limitation restricts interpretive depth in two respects: such interventions may have influenced both the level and composition of firms' debt during the pandemic, and may partially account for the observed shift from short-term to long-term financing; additionally, heterogeneous access to these programs across firms may have moderated the overall reduction in leverage documented in the main analysis, making it difficult to fully disentangle the effects of firm-level financing adjustments from those of policy-induced debt restructuring.

Third, although firm fixed effects and the GMM estimator were employed to address endogeneity concerns, some residual bias may remain due to unobserved time-varying factors, reverse causality, or measurement errors, potentially limiting the strength of causal inferences. Fourth, the single-country focus of the study limits the direct generalizability of the findings beyond the Portuguese context. However, Portugal's institutional and structural characteristics, including SME dominance, bank dependence, and tourism specialization, are broadly shared across Southern European economies, suggesting that the findings may offer relevant insights for other tourism-intensive, bank-dependent economies facing similar systemic shocks.

Future research should incorporate regional and sectoral heterogeneity to assess whether the observed patterns persist across diverse industries and geographic contexts. Comparative analyses between sectors heavily affected by the pandemic, such as hospitality, restaurants, and aviation, and less-impacted sectors, such as technology and healthcare, would provide additional insight into the generalizability and robustness of the findings. Moreover, examining the role and effectiveness of financial aid programs and public policy interventions during the crisis may clarify their moderating effects on firms' capital structure decisions. Specifically, studies utilizing firm-level data on government support uptake are well positioned to examine how the type, timing, and magnitude of these interventions influenced debt maturity choices and contributed to the varied financing responses among firms of different sizes.

Additionally, studies with access to firm-level data on credit market conditions and bank credit availability would further enable more precise identification of the mechanisms through which credit market frictions shape leverage decisions under financial stress, thereby substantially enriching the understanding of SME financing behavior during systemic crises. Future research could also explore the role of financial constraints as a formal determinant of capital structure adjustments during crisis periods, examining whether firms with different degrees of financial constraint respond differently to exogenous shocks.

CRediT authorship contribution statement

Alice Carolina Ames: Writing – review & editing, Visualization, Validation. **Maria Francisca Gomes de Castro Coelho Palminha:** Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Aviner Augusto Silva Manoel:** Writing – review & editing, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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