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The financial life cycle of European SMEs before, during and after crisis periods. What is the role of a country's financial system?

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ABSTRACT

This paper contributes to the financial life cycle literature by studying the effect of firm age on SMEs' debt policies, focusing for the first time on a multi-country context comprising 28 European countries. It also examines, in a novel way, whether this effect is influenced by periods of economic crisis, and in particular whether the global financial crisis and the European sovereign debt crisis shape SMEs' financial life cycles in comparison to pre- and post-crisis periods. Our pre-crisis findings show a high use of debt in the early stages of SMEs' life cycles, decreasing over time. During the crises we observe that the negative age/debt relationship becomes weaker and non-statistically significant compared to pre-crisis periods. After the crises we observe a gradual return to the pre-crisis pattern, to a lower extent for younger and more informationally opaque SMEs. Most notably, we interestingly find that the pre-, during and post-crisis patterns strongly differ according to level of financial development of the country in which a SME operates. Before and after crises, SMEs in more financially developed countries show a stronger tendency to reduce debt as they age thanks to better access to capital and lower information asymmetries. However, during crises this moderating effect disappears, revealing how even healthy financial systems can become ineffective under extreme stress. Our work highlights the significant role of banks and bank lending during difficult periods, suggesting that robust financial institutions play a key role in absorbing economic shocks and supporting SMEs' financial trajectories.

1. Introduction

The way firms manage their debt policies has traditionally been studied following two main theoretical models. On one hand, according to the trade-off theory, firms are in search of an optimal debt/equity mix (e.g. Kraus & Litzenberger, 1973). This approach suggests that firms with a consolidated business tend to use more debt. These firms have stable profits, working capital and cash flows and therefore financial flexibility is relatively less important to them, having lower costs of distress and less informational opacity (Berger & Udell, 1998). On the other hand, according to the pecking order theory (e.g. Myers & Majluf, 1984) and the extent of relevance of asymmetric information,[1] firms follow a hierarchical order of preferences in financing choices: they first prefer to use internally generated cash, then debt and lastly equity. The degree of informational opacity changes over time and drives the financial life cycle (Kaplan & Stromberg, 2003). The financial life cycle of firms is a widely studied phenomenon in corporate finance, describing how companies' financial needs, capital structure and funding sources evolve over time (Berger & Udell, 1998). It is grounded in life cycle theory, which suggests that firms experience predictable financial transitions over time, influenced by internal and external factors (Mueller, 1972). Firms typically move through distinct stages – start-up, growth, maturity and decline – each characterised by specific financial needs and financing constraints (Damodaran, 2007).

Notwithstanding a large body of literature, studies testing the trade-off and the pecking order theories do not fully explain all the broad

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[1] According to Tirole (2010) asymmetric information in corporate finance is a situation where "the issuer may raise less funds or raise funds less often when the capital market has limited access to information about the firm".

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patterns of corporate financial choices (e.g. Hadlock & Pierce, 2010). One potential reason for controversial evidence could be related to the existence of a *pro-tempore* optimal capital structure or a *pro-tempore* pecking order that changes throughout the life cycle of the firm. Consequently, when analysing the financing policies of SMEs, the financial life cycle theory could provide explanations for deviations from the trade-off and the pecking order theories in light of a firm's age, linked to information opacity and financial constraints (Fee et al., 2009).

The literature on firms' life cycles is a hot topic in corporate finance studies and continues to attract significant attention due to current gaps (Abuhommous, 2023; Annan et al., 2024; Gabrielli & Greco, 2023; Hoberg & Maksimovic, 2022; Hu et al., 2025). A huge body of literature makes it clear that the firm's life cycle is an important driver of SME financing policies that evolve over time as the firm's characteristics change (Berger & Udell, 1998; Hirsch & Walz, 2011; La Rocca et al., 2011; Sanchez-Vidal & Martín-Ugedo, 2012; Serrasqueiro & Nunes, 2012). Basically, two views of the financial life cycle emerge from the extant literature. One suggests that young firms use less debt due to their limited access to bank financing. This perspective considers that early-stage firms enjoy more opportunities for growth but are less likely to generate cash, and therefore they need to rely on external finance (Deloof & Vanacker, 2018). The other argues that young firms, lacking internally generated liquidity, rely on bank loans. This approach suggests that mature firms report higher levels of cash holdings and have less external financial needs, suggesting a higher use of internal finance (Bulan & Yan, 2009). A pioneering contribution in this regard is that of Berger and Udell (1998), who state that newly established firms tend to rely primarily on equity provided by founders, friends and family. This is because new firms often lack a sufficient track record to obtain external financing. As the firm grows and develops an operating history, it can begin to access debt financing. Similar findings were observed about a decade later by Hirsch and Walz (2011).

However, an initial shift in this paradigm can be seen in the work of Sanchez-Vidal and Martín-Ugedo (2012), leading to growing empirical evidence in recent decades confirming the importance of getting new firms involved in the banking system (Bolton & Freixas, 2000; Cosh et al., 2009; Deloof & Vanacker, 2018; Diamond, 1991; Hanssens et al., 2016; La Rocca et al., 2011; Robb & Robinson, 2014). Mac an Bhaird and Lucey (2011) highlight that younger firms tend to use more debt. Analysing US firms, Robb and Robinson (2014) also observe start-ups' strong initial dependence on bank debt, often secured by personal financial resources. Moreover, according to Keasey et al. (2015), this effect appears stronger in young family businesses. Drawing on a sample of Finnish firms, Ylhäinen (2017) suggests that SMEs rely more on financial intermediaries in the early stages of their life cycles, though this dependence tends to decrease over time. Deloof and Vanacker (2018) also reaffirm that internal resources are insufficient to sustain the growth of new firms, making debt crucial. Furthermore, Deloof et al. (2019) emphasise that financial markets help alleviate initial credit constraints, encouraging debt use, while in later stages firms generate internal resources to sustain their activities. Overall, existing research confirms that bank debt is a fundamental source of financing in the early stages, followed by a subsequent reorganisation of the capital structure (Deloof et al., 2019).

In general, the entire literature on financial life cycle theory agrees that each phase of a business's life cycle is characterised by a different financial need and changing debt over time. Consequently, the optimal debt/equity mix or the order of preferences in financial choices can evolve through the phases of the life cycle, as evidenced by La Rocca et al. (2011). The authors specifically analyse that during the start-up phase companies face issues related to information opacity and a lack of market credibility. Debt is often the primary choice of financing. Then, during the growth phase, with the increase in opportunities for expansion, a combination of debt and internal capital is observed. Meanwhile, in the maturity phase debt is reduced while the use of internal capital increases.

With regard to the current literature, a key aspect to consider is that previous studies have largely examined the financial life cycle of SMEs during stable economic conditions or homogenous credit environments (Deloof & Vanacker, 2018). However, credit is strongly linked to the economic cycle (Chortareas et al., 2020). Moreover, empirical studies suggest both that the financing problems of SMEs are exacerbated during turmoil and financial crises (Casey & O'Toole, 2014; Poeschl, 2023; Zubair et al., 2020) and that the institutional context plays a key role (La Rocca et al., 2019; Saona et al., 2020; Zhu et al., 2023). For instance, Zubair et al. (2020) interestingly show that financial crises influence the effect of financing on the investment decisions of small firms, while Fasano et al. (2022) demonstrate that institutions and macro-economic conditions affect firms' financial behaviours especially for SMEs and during crisis periods, indicating that the institutional environment in which SMEs operate matters. While corporate life cycles are a hot topic in corporate finance as noted above (e.g. Hu et al., 2025), Habib and Hasan (2019) suggest that papers investigating the determinants of corporate life cycles are very few. By taking inspiration both from the contribution of Zubair et al. (2020), who study the role of debt and internal finance for SMEs during crisis periods, and the work of La Rocca et al. (2011), who examine the effect of age on the choice of debt, we contribute to the studies on the effect of age on the financing of SMEs by providing three new aspects. First, in contrast with previous studies on this topic (e.g. La Rocca et al., 2011), we study SMEs' financial life cycles using a large multi-country sample, accounting for the diversity of institutional contexts where SMEs operate, allowing for a better generalisation of empirical results. Our research question is: "Do financial crises shape SMEs' debt decisions during their life cycles?". Second, we investigate how two financial crises, i.e. the 2008–2010 global financial crisis (GFC)[2] (Arthur et al., 2015) and the 2011–2013 sovereign debt crisis (SDC)[3] (Stamatopoulos et al., 2017), have affected financing policies throughout the life cycles of SMEs. Both crises had profound and far-reaching effects on economies, influencing various sectors and aspects of societal well-being (Becker & Ivashina, 2018; Grant & Wilson, 2012). Third, we study whether the crises' effect changed depending on the degree of development of the financial system of a country, answering the following research question: "How does the strength of a country's financial system shape SMEs' debt policies in times of crisis?". Encouraged by the contribution of Zubair et al. (2020), we focus on SMEs' financial life cycles before, during and after the financial crises to see the consequences on the financial life cycle due to economic downturns. Moreover, we validate our results through many tests of robustness, including controls for endogeneity.

We show that the typical inverse age/debt relationship – where younger firms rely more on debt – weakened during the GFC and the SDC. Crucially, our results also reveal that the impact of crises on SMEs' financial life cycles is significantly mitigated in countries with more advanced financial systems. In these contexts, firms maintain a more stable access to credit and are better positioned to revert to pre-crisis financing patterns. Conversely, in financially underdeveloped countries the disruption is more severe and long-lasting, especially for younger and more opaque firms.

Studying the financial behaviour of SMEs throughout their life cycles and during times of crisis yields significant insights with important

[2] The GFC refers to a period of extreme stress in global financial markets and banking systems. It was triggered by a downturn in the U.S. housing market, which led to a financial crisis that spread worldwide through the interconnected global financial system (Claessens & Kose, 2013).

[3] The sovereign debt crisis refers to the period during which several European countries faced severe financial distress due to high levels of government debt and deficits. This crisis led to significant economic and political instability, requiring substantial intervention by international organisations such as the European Central Bank and the International Monetary Fund (Kalemli-Özcan et al., 2016).

implications for firms, governments and financial institutions. This analysis offers recommendations for tailoring financial policies based on a firm's life-cycle stage and the broader macroeconomic context. Moreover, it acknowledges the pivotal role of debt, which is the most-used source of financing in Europe (European Central Bank, 2024) facilitating economic recovery during turbulent situations.

The paper is structured as follows. The second section describes the theoretical framework of the financial life cycle and develops our hypotheses. The third section reports data and methodology. The fourth, fifth and sixth sections present the results. The paper ends in section seven with the conclusions and a discussion of the implications.

2. Literature review: Theory and empirical evidence

There are two main theoretical approaches that explain corporate financial policies during their life cycles.[4] A first traditional perspective (reputation effect argument) suggests that young firms first use owners' equity (including venture capital and angel investments) or retained earnings, and then external debt during the maturity phase (Fluck, 2000; Kaplan & Stromberg, 2003). This is because young firms have a low debt capacity due to the absence of past experience and the lack of a historical track record. In the early stages of their growth cycle, firms lack a repayment history or profitability record that external lenders can depend on (La Rocca et al., 2011). In this context, banks are not inclined to serve young and informationally opaque SMEs (Berger & Udell, 1998) that have to rely on retained earnings. For such firms, internal resources provided by the entrepreneur or their family are essential. Once these resources are depleted, venture capital becomes the primary option. On the contrary, in the maturity stage the use of debt will increase thanks to corporate reputation and collateral. This is because older firms have typically earned a positive reputation in the market (Diamond, 1991).

A second theoretical approach suggests a reverse formulation. Young firms could submit themselves to bank monitoring to obtain a certification of their quality and credibility in the product market (certification effect argument). Diamond (1991) argues that the lack of a track record and creditworthiness can be balanced by the submission to bank monitoring. In this way, firms can prove the quality of their businesses and banks can support their competitiveness. As a result, firms in the early stages issue external debt, often providing shareholders' personal properties as collateral (Diamond, 1991; Petersen & Rajan, 1994). Thus, young firms are basically externally financed while mature ones substitute debt with internally self-generated financial resources (D'Amato, 2020; Palacín-Sánchez et al., 2013).

Empirical evidence in the last 30 years supports the relevance of the certification effect (Bolton & Freixas, 2000; Cosh et al., 2009; Deloof & Vanacker, 2018; Diamond, 1991; Hanssens et al., 2016; La Rocca et al., 2011; Robb & Robinson, 2014). For instance, Cosh et al. (2009) suggest that the external source from which start-ups acquired the majority of their capital is banks. Deloof et al. (2019) point out that the financial market alleviates the financial constraint problems of start-ups, favouring their use of debt, while in later stages the firm will be able to self-generate financial resources and the owner will be more inclined to re-inject self-generated financial resources into the firm. Similarly, Robb and Robinson (2014) observe that start-ups heavily depend on external debt, often in the form of bank financing, and a significant number of start-ups secures debt by utilising the personal financial resources of the entrepreneur. Deloof and Vanacker (2018) find that for a new firm insider financial resources are often not sufficient to sustain its growth, meaning that start-ups depend on external debt. Moreover, firms that leverage debt during their initial stages have a significantly higher likelihood of survival and reaching greater revenue levels (Cole & Sokolyk, 2018). The importance of debt for young firms has also been highlighted by Klein et al. (2019), evidencing that in recent years start-ups rely on external debt also in the form of digital financing instruments. According to the certification effect argument, all these authors suggest the idea that during the first year the single-most important source of funds is from bank debt, while during the maturity phase firms rebalance their capital structure. Thus recent research on the topic suggests the importance of debt financing for start-ups (Deloof et al., 2019), inspiring the potential idea of a decreasing pattern (as observed by La Rocca et al., 2011) throughout a firm's life cycle: an inverse relationship between a firm's age and its use of debt. Fig. A.1 in the appendix clearly illustrates this pattern. However, in this new article we want to extend the analysis further by examining whether and how financial crises alter this inverse age/debt relationship. Indeed, in this research context, we argue that historical, economic and institutional context could play a role in explaining financial policies during the life cycle. Yet in previous studies there is a lack of consideration of external factors affecting an empirical investigation. Moreover, the macroeconomic context is also a key factor influencing the speed of adjustment to target levels of debt (e.g. Drobetz & Wanzenried, 2006). This is important to capture the dynamic nature of the factors affecting the financial life cycle of SMEs.

This research gap is surprising, as firms adapt their financing policies to the position of the economy, and macroeconomic factors could significantly influence firms' financial policies during their life (Chortareas et al., 2020). Certainly, benefits and costs of debt vary during crisis periods, as debt could be riskier because of the overall economic condition (Adjei, 2012; Armanious & Zhao, 2024; Machokoto et al., 2020; Pianeselli & Zaghini, 2014). Indeed, the variety of benefits and costs related to the use of debt significantly affects corporate value, especially during periods of credit contractions (Machokoto et al., 2020). Adjei (2012), for example, demonstrates that firms with higher debt dependence experienced a more significant decline in performance from the pre-crisis to the crisis period. On the contrary, for firms with lower debt levels new borrowing did not show a significant impact on performance during the crisis.

In fact, a firm's financial behaviour is shaped by financial shocks in the institutional context (Holmstrom & Tirole, 1997). The GFC crisis is a clear example of a credit shock that increased the risk of business failure (Martinez et al., 2019), as it amplified asymmetric information problems and exacerbated financing constraints of firms (Campello et al., 2010; Ivashina et al., 2010; Kahle & Stulz, 2013), especially for SMEs (Psillaki & Eleftheriou, 2014). As suggested by Deloof and Vanacker (2018) and Zubair et al. (2020), during a financial crisis SMEs are expected to rely less on bank loans relative to pre- or post-crisis years. An interesting paper by D'Amato (2020) shed light on the impact of SMEs' age on financial debt at the time of the GFC because of high costs of debt and financial constraints. He points out that during the financial crisis restrictions are higher for SMEs, more than large firms. As a result, during a recession credit-constrained SMEs could rely more on other types of external finance to sustain their investments,[5] especially trade credit (Carbo-Valverde et al., 2016; Dottori et al., 2024) and cash holdings (Zubair et al., 2020).

Although past literature mainly focused on the 2008–2010 GFC and its striking events and scandals (such as the failure of Lehman Brothers in the United States), several studies also paid attention to another significant financial shock that followed immediately thereafter (Hoque, 2013), i.e. the sovereign debt crisis (Albertazzi et al., 2014; Dorsman & Gounopoulos, 2013; Ferrando et al., 2017; Gkillas et al., 2021; Lane, 2012). This crisis followed the GFC and took place in 2011–2013 when Euro-area members faced sovereign debt tensions. Albertazzi et al. (2014) find that an increased sovereign risk has material consequences on corporate financial policies. Their work evidenced that the increased spread between the yield on the 10-year Italian government bond and

[4] A table that summarises the two different approaches is provided in the appendix.

[5] Investments are in turn affected by a firm's life cycle (Khemka et al., 2021).

the corresponding BTP-Bund spread in Germany in 2011 increased the cost of credit for firms, reducing their access to external financing. Ferrando et al. (2017) observed that SMEs in countries affected by SDC became more likely to be denied credit.

All these arguments suggest that the two crises substantially hindered the capacity of firms to secure credit, with SMEs experiencing the most profound consequences of credit restriction (Castaldo et al., 2023). Indeed, as evidenced by the trade-off theory, large, consolidated firms are less financially constrained. Thus the GFC and the SDC generated financial constraints, especially for SMEs that historically suffer from greater informational asymmetries (Berger & Udell, 1998), resulting in a reduction in the amount of debt used (Cowling et al., 2012). However, it is not just the amount of debt used that changes *tout court* during and after a crisis period. It is important to understand that both during and after crises financial decisions differ depending on the age of the firm. In this regard, we contribute to the extant literature by inquiring how the higher use of debt in the early stage of the life cycle and the decreasing use in the late phases[6] observed by the all the above-mentioned contributions supporting the certification effect argument could be shaped in the presence of crisis situations. Considering that, as suggested by the trade-off arguments, small businesses had more difficult access to capital and are the most adversely affected by credit crunches, we suppose that during the GFC and the SDC the inverse age/debt relationship would be less pronounced. Constraints in the financial market, weak economic condition and shortage of liquid resources (which represent a primary choice according to the pecking order arguments) could lead companies to a lack of alternatives to debt, resulting in a lower reduction in debt as age increases.

What about the post-crisis period? While young enterprises are the ones most affected by a crisis (Cowling et al., 2018), an interesting body of literature suggests that the obstacles to obtain debt in the crisis period did not discourage firms from seeking loans in a subsequent period (e.g. Mac an Bhaird, C., 2013). Brown and Lee (2019) studied the capital structure decisions and access to credit after the GFC, observing that SMEs sought external sources of funding after the global financial crisis. The authors analyse how these firms dealt with funding access challenges and which funding sources were most effective in supporting their growth. After periods of crisis, there is generally a recovery phase in which firms regain the confidence in financial markets that they had lost during the crisis. Once this confidence is regained, firms resume seeking external debt. However, after a crisis, credit difficulties cannot be fully overcome in the short term, and economies cannot reach pre-crisis levels in a short time (Tang & Upper, 2010). Therefore, in the short term access to credit cannot return as it was in the periods before the crisis. These obstacles remain consistently higher for informationally opaque young SMEs, which according to Vermoesen et al. (2013) were "ex ante more likely to be financially constrained". In such a context, financial markets tend to revert to the credit conditions that preceded the crisis. This trend of returning to pre-crisis market conditions implies a loosening of financial constraints for firms, for which we expect that the age/debt relationship will show a gradual return to the pre-crisis patterns. However, we suppose that this return may not proceed in a similar vein for business with different levels of asymmetric information problems, and thus different possibilities of access to financial markets. As evidenced by Mac an Bhaird, C. (2013), the businesses that are most financially troubled bear the worst consequences of the credit crunch. After the GFC, firms suffering from greater informational asymmetries experienced problems of financial constraints. Specifically, for more informationally opaque firms bank credit restrictions persisted for a longer period (Driver & Muñoz-Bugarin, 2019; Riley et al., 2014). In support of this, Davis et al. (2013) observed that the rejection of applications for loans to smaller firms (which face more informational problems than large ones) were higher from 2008 onwards than they had been since 2001. Considering that SMEs face relevant informational asymmetry issues, especially in post-crisis periods (Fosu et al., 2016), we expect that there will be a delay in returning to pre-crisis situations. Also, Fort et al. (2013) suggest that SMEs tend to be more affected by economic shocks compared to their larger counterparts.

In any case, although delayed due to the lingering effects of the crisis, we expect that the age/debt relationship after the crisis will tend towards what was observed pre-crisis. Therefore, we expect that the decreasing pattern observed by La Rocca et al. (2011) and also other authors is lower for small businesses during crisis periods compared to pre-crisis periods. In a similar vein, we posit that the decreased slope observed during the crisis will distinguish this relationship from that of the post-crisis period, with a return to the pre-crisis pattern.

H1. The impact of age on SME debt polices is reduced during crisis periods compared to pre- and post-crisis periods.

The noteworthy contribution of Rajan and Zingales (1998) demonstrated that the financial development of a country significantly influences capital structure decisions. Indeed, well-developed financial institutions have the potential to mitigate agency problems (Giannetti, 2003), reduce borrowing costs (Beck et al., 2011) and improve credit availability for SMEs (Fasano & Deloof, 2021), but other benefits are also provided (Basha et al., 2023; Li et al., 2024). These institutions not only facilitate access to external financing, but also support market liquidity, promoting a more diversified financial ecosystem (Levine, 2005). Facilitating the strengthening of the banking system would also lead to smoother business transactions, increased competition among banks and consequently a more efficient allocation of funding (Antzoulatos et al., 2016; Fan et al., 2012; Holmstrom & Tirole, 1997; Leary, 2009). Empirical studies suggest that in countries with stronger financial institutions firms rely more on bank debt, while in less developed financial environments sources of alternative financing become predominant (Beck & Demirguc-Kunt, 2006). Such an influence of financial institutions can be different depending on the phases of a firm's life cycle (Deloof & Vanacker, 2018; Hanssens et al., 2016) and the macroeconomic situation in which a firm operates (La Rocca et al., 2019). Indeed, financial development affects firms' debt capacity differently depending on their age and informational opacity, as younger SMEs in economies with highly developed financial systems tend to obtain credit under more favourable conditions (Brown & Lee, 2019).

Thus the impact of a crisis on the real economy raises the question if and how the age/debt effect is conditioned by the financial development of a country (Fornari et al., 2012). It is of interest to investigate whether and how the degree of development of a country's financial system could impact the relationships investigated in our first hypothesis.

A key argument supporting this stems from the asymmetric information theory, according to which a well-developed financial system reduces the information gap between firms and financial intermediaries, thereby increasing the use of debt (Fasano & Cappa, 2022; Fasano & La Rocca, 2023). During periods of turmoil, countries with a better developed financial system have superior capacity to reduce the asymmetric information gap and sustain businesses against negative contingencies (La Rocca et al., 2019). This kind of support has also been highlighted by Beck et al. (2008), according to whom firms in nations with weaker institutions tend to utilise less external funding, particularly from banking sources. Ge and Qiu (2007) point out that firms operating in countries with poorly developed financial systems have difficulties financing their activities using bank debt as the traditional channel of funding. This could indicate that in highly developed financial contexts, during a crisis firms could face less information opacity and could consequently have better access to debt compared to their counterparts operating in environments that are less developed financially. Empirical evidence suggests that financial system development moderates the impact of economic crises on firm financing. In highly developed

[6] Which indicates a decreasing age/debt relationship pattern, as observed by La Rocca et al. (2011).

contexts, firms experience lower information opacity and maintain better access to credit during downturns (Allen et al., 2018). Indeed, Demirgüç-Kunt et al. (2020) observe that in nations with "shallower financial markets and less developed financial infrastructure" the influence of the GFC was more severe. Conversely, in nations with weaker financial structures, heightened asymmetric information issues may constrain firms' ability to secure debt financing, prolonging the negative effects of crises (Beck et al., 2008; Love and Martínez Pería, 2015). Furthermore, the post-crisis recovery trajectory is expected to be smoother in financially developed countries, where banking systems can efficiently restore credit supply, unlike in environments with low financial development where persistent credit friction may hinder recovery (Anginer et al., 2020; Gambacorta et al., 2014).

Thus, the lower impact suggested in our first hypothesis could be milder for SMEs in countries with high financial development (or, vice versa, more heightened for SMEs in countries with low financial development). Following the same reasoning, after the crises the return to the pre-crisis patterns of SMEs could be easier in those countries where the financial system is better developed. On the contrary, in less developed nations the heightened asymmetric information issues could potentially limit such a reversion. Indeed, in such countries SMEs may face more severe financing constraints during crises, delaying their return to pre-crisis financing patterns.

H2. The impact of a crisis on the financial life cycle is moderated by the financial system's level of development.

3. Data and methodology

3.1. Sample

We collected accounting data using the Amadeus database of the Bureau van Dijk. We selected only SMEs according to the European Commission's definition in terms of firms not exceeding 43 million euros in total assets and having less than 50 million euros in total annual revenue (Serrasqueiro & Nunes, 2012). The SMEs in our sample come from 28 European countries.[7] We left out observations whose accounting information were not available and we excluded financial sectors. To reduce the impact of outliers, we winsorized all the accounting variables based on the 1st and 99th percentiles of the distribution. Data on real GDP and countries' financial development were collected from the World Bank. The final sample consists of unbalanced panel data of 97,327 SMEs for a total of 961,249 observations from 2005 to 2016. We specifically used this period because it includes the last three years before the GFC, the three years of the GFC, the subsequent three years of the following SDC, and the three years after the overall crisis period.

3.2. Model and variables

We used the ordinary least squares cluster technique with standard errors clustered at the country and industry level (OLS Cluster).[8] This approach further enriches the findings of previous studies because it allows for controlling for observations that are correlated under two dimensions, and because regressions correct the standard errors for the possible dependence of the residuals within clusters. Two-way clustered standard errors provide more robust estimates compared to one-way clustering, reducing the risk of underestimating or overestimating statistical significance. More specifically, this technique controls for the fact that the data used may exhibit correlation both within countries (due to common macroeconomic or institutional factors) and within industrial sectors (due to shared sector-specific dynamics). We do not consider firm fixed effects because the level of national financial development changes very little over the period considered in our study. Clustering the errors enables this variability to be preserved in the regressions. The dependent variable is *Debt*, which is a proxy of the debt/equity mix (the so-called capital structure) and is calculated as the ratio of financial (or interest-bearing) long-term and short-term debt (excluding trade debt) scaled by total assets (La Rocca et al., 2011). The variable *Age* is calculated as the natural logarithm of the number of years since the date the firm was founded.

To test hypothesis 1 we need to account for three sub-periods: 1) the three-year pre-crisis period 2005–2007, (2) a crisis period that concerns both the GFC (2008–2010) and the SDC (2011−2013), (3) the three-year post-crisis period 2014–2016. We therefore used the baseline model with interactions of the variable *Age* with the variable *Dummy Crisis period*, which is equal to 1 for observations in the period 2008–2013, and the variable *Dummy Post-Crisis period*, which is equal to 1 for observations in the period 2014–2016. This is the model applied.

$$\text{Debt} = f\,[\text{Age}, \text{Dummy Crisis}, \text{Dummy Post} - \text{crisis}, \text{Age} \times \text{Dummy Crisis}, \text{Age} \times \text{Dummy Post} - \text{Crisis}, \text{Control variables}]$$

Lastly, to check hypothesis 2, we applied the previous model in interactions with a variable that represents the degree of financial development at the country level (*Financial Development*). Specifically, we used a World Bank indicator computed as the ratio of domestic credit provided by banks as a percentage of GDP (Batrancea et al., 2023). The previous model was applied in three sub-samples: a Pre-crisis period, a Crisis period, a Post-crisis period. This is the model applied.

$$\text{Debt} = f\,[\text{Age}, \text{Financial Development}, \text{Age} \times \text{Financial Development}, \text{Control variables}]$$

In line with several empirical contributions in this field of research (e.g. La Rocca et al., 2011), we controlled for firm-specific variables that previous studies have demonstrated to be related to corporate debt.

[7] The list of countries is reported in Table 2.

[8] We classified industries based on the NACE codes and we used the Mitchell Petersen's Stata routine cluster standard errors by two dimensions (available at https://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm).

Table 1
Descriptives.

	Mean	Median	SD	Min	25 perc	75 perc	Max
Debt	0.196	0.120	0.219	0.000	0.000	0.327	0.959
Age	13.26	7	20.47	1	4	11	163
ROA	0.059	0.045	0.142	−0.643	0.011	0.103	1.177
Size	7.627	7.744	1.413	0.888	6.691	8.580	11.228
Tangibility	0.261	0.179	0.250	0.000	0.052	0.414	0.941
Cash Holdings	0.107	0.047	0.145	0.000	0.010	0.146	0.812
Growth Opportunities	0.027	0.001	0.072	−0.009	−0.001	0.004	0.240
GDP Growth	1.006	1.293	2.808	−14.839	−0.046	2.507	25.163

No. of observations: 961,249. Note: The Age variable is reported in its original form without the logarithm.

- *ROA*, the ratio between earnings before interest and taxes to total assets (e.g. Yazdanfar & Ohman, 2015).
- *Tangibility,* the ratio of property, plant and equipment to total assets (Saona et al., 2020).
- *Size*, the natural logarithm of total assets (Fasano & Deloof, 2021).
- *Cash Holdings*, the sum of cash and cash equivalents scaled to total assets (Fasano & Deloof, 2021).
- *Growth opportunities, which* can be expressed as the change in a company's sales between one year (t) and the previous year (t-1), represented as a percentage. Essentially, the sales of the previous year are subtracted from the current year's sales, and the result is divided by the sales of the previous year (La Rocca et al., 2011).
- To consider differences in national economic development, we include *GDP Growth*, which is measured as the growth in real GDP at the national level from year (t − 1) to year (t).
- We added year, industry and country fixed effects.

Table A.1 in the appendix provides a description of the variables.

4. Descriptives and correlations

Table 1 analyses the descriptive statistics of the variables used in our regressions.

The average level of debt in European SMEs is 19.6 % and is in line with the main extant empirical papers in this field of research. In Table A.2 in the appendix we report the list of countries in our sample, for each nation indicating the mean level of debt.

The results show a substantial heterogeneity in the use of debt among countries. We also found a high heterogeneity at the country level in the use of debt before and after the two crisis periods investigated.[9] In Table A.3 we scrutinise the use of debt differences at the industry level.

Table A.3 shows that the level of debt used by SMEs also varies significantly across industries, as observed by recent contributions (e.g. Fasano et al., 2023). As an additional descriptive statistic, Table A.4 reports the mean value of debt for the subsamples based on *Age* using a range of five years for each subsample.

Fig. A.2 and Table A.4 highlight the varying usage of debt between young and old SMEs (according to the respective 25 and 75 percentiles of the *Age* variable) during the pre-crisis period. During the crisis, young SMEs reduced their debt stock, whereas old SMEs increased theirs. However, in the post-crisis period both types of SMEs decreased their debt stock within their capital structures. This suggests that the shock of the financial crisis had divergent impacts depending on the age of the SMEs, confirming the need to study this phenomenon.

Furthermore, it is interesting to replicate Fig. A.3, sorting the sample by the median between high and low financially developed countries. Using the World Bank variable, we considered the pre-crisis year (2007) to sort the samples into two sub-groups, from a high to a low level of financial development. We used the pre-crisis year to consider how the ex-ante financial development of a country was able to moderate the effect of the crisis on our core relationship. This approach is similar to the one used by Deloof and Vanacker (2018), who considered bank dependence before the crisis.

Table A.5 shows the list of countries sorted by the median value of financial development in two sub-groups (High v Low).

Fig. A.3 and Fig. A.4 show the wide difference in the Age/Debt relationship that appears between countries having diverse financial development. There is a difference at the starting point of the analysis (before the crisis), and even during the crisis and also the post-crisis period there was a different output in terms of mean indebtedness among firms due to the financial context.

Finally, Table 2 shows the correlation matrix among explanation variables.

The negative correlation between the variables *Debt* and *Age* is evident. We further tested possible multicollinearity among our variables using the variance inflation factors (VIFs). The maximum VIF in our model is 1.15, which is far below the generally accepted cut-off of 10. Therefore no bias was detected in the significance of our results.

5. Empirical results

With regards to hypothesis 1, Table 3 columns 1, 2 and 3 present the results considering the continuous variable *Age* in relation to *Debt* for the whole period of analysis. Specifically, column 3 reports our main model results. Moreover, columns 4, 5 and 6 regard regression results based on the subsamples of pre-, during and post-crisis periods.

We found that European SMEs' age is negatively related to the use of debt. European SMEs tend to gradually decrease the use of debt throughout their life cycles. These results corroborate those observed by the many contributions within the framework of life cycle theories that underline the importance of debt for start-ups (e.g. Robb & Robinson, 2014 or Deloof et al., 2019), supporting the certification effect argument. Moreover, they confirm the relevance of a firm's age on its financial decisions (Michaelas et al., 1999). Still, these results are particularly important, as they confirm that the findings of the work of La Rocca et al. (2011) persist more than ten years later even in a broader and more generalised European setting. Thus, consistent with La Rocca et al. (2011), our analysis confirms the well-established inverse relationship between firm age and debt financing. To study the relationship between firm *Age* and *Debt* conditioned by two contiguous macroeconomic financial shocks, namely the GFC and the SDC (overall period 2008–2013), column 2 shows the complete sample regressions including crisis and post-crisis dummies, while column 3 considers the interaction between *Age* with both the crisis and post-crisis dummies.

Column 3 reports a negative significant effect for the *Age* variable, for the two dummies related to the crisis and post-crisis period, and for two positive interaction terms. It is noteworthy to observe what happens in the crisis period. The coefficient of the Age variable (−0.031) and of the interaction between Age and Crisis Dummy (0.031) is the same but with an opposite sign. In short, the negative relationship between Age and Debt is almost nullified during the financial crisis period. This result is confirmed also considering the lack of statistical significance for the coefficient of Age in the sub-sample of the crisis period.

[9] Tables are available from the authors upon request.

Table 2
Correlation matrix.

	1	2	3	4	5	6	7	8	VIF
Debt	1.00								
Age	−0.05	1.00							1.15
ROA	−0.15	0.01	1.00						1.06
Size	0.17	0.23	−0.05	1.00					1.10
Tangibility	0.27	0.03	−0.08	0.08	1.00				1.06
Cash Holdings	−0.27	0.02	0.23	−0.18	−0.23	1.00			1.15
Growth Opportunities	−0.01	0.19	0.01	−0.02	−0.01	0.03	1.00		1.04
GDP Growth	−0.04	0.23	0.08	0.03	0.06	0.08	0.09	1.00	1.08

Note: Correlations greater than 0.03 or lower than −0.03 are statistically significant at the 0.05 level or lower.

Table 3
Financial life cycle, capital structure and crisis: main regression results (**Hypothesis 1**).

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample	Whole sample	Main Model (Whole sample)	Pre-crisis period	Crisis period	Post-crisis period
Age	−0.019***	−0.016***	−0.031***	−0.034***	−0.001	−0.019***
	(0.003)	(0.003)	(0.005)	(0.006)	(0.003)	(0.003)
Dummy Crisis period		0.002	−0.066***			
		(0.002)	(0.012)			
Dummy Post-crisis period		−0.021***	−0.061***			
		(0.003)	(0.012)			
Age × Dummy Crisis			0.031***			
			(0.006)			
Age × Dummy Post-Crisis			0.016***			
			(0.004)			
ROA	−0.115***	−0.117***	−0.117***	−0.210***	−0.096***	−0.115***
	(0.007)	(0.007)	(0.007)	(0.010)	(0.006)	(0.007)
Size	0.021***	0.021***	0.021***	0.023***	0.020***	0.021***
	(0.006)	(0.006)	(0.006)	(0.009)	(0.006)	(0.006)
Tangibility	0.180***	0.179***	0.179***	0.136***	0.193***	0.180***
	(0.026)	(0.026)	(0.026)	(0.025)	(0.030)	(0.026)
Cash Holdings	−0.268***	−0.265***	−0.264***	−0.260***	−0.278***	−0.268***
	(0.018)	(0.018)	(0.018)	(0.012)	(0.023)	(0.018)
Growth Opportunities	0.010*	0.018***	0.017***	0.038***	0.025***	0.010*
	(0.005)	(0.006)	(0.005)	(0.014)	(0.006)	(0.005)
GDP growth	−0.001***	−0.001***	−0.001***	0.002	0.000***	−0.001***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)
Adjusted R^2	0.198	0.199	0.201	0.199	0.204	0.198
Observations	961,249	961,249	961,249	250,424	437,489	273,336

Notes: Year, country, industry fixed-effect dummies are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

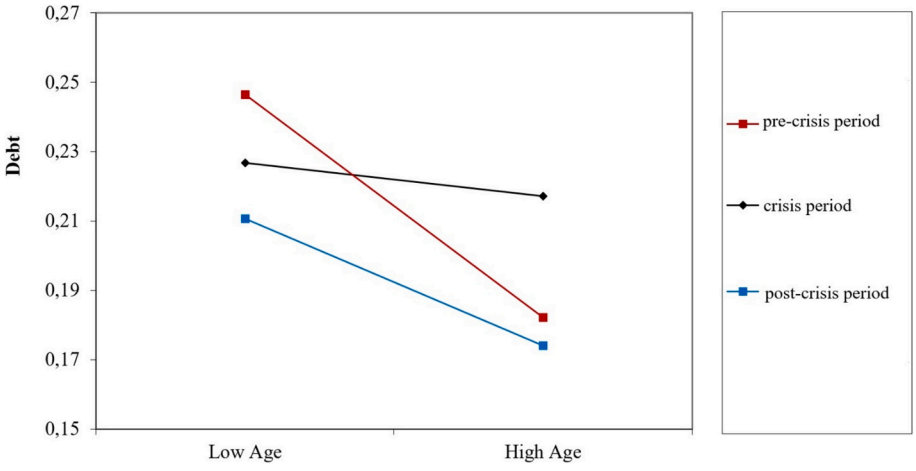

Fig. 1. Effect of age on debt pre-, during and post-crisis.

To better understand the results of the interaction model it is useful to plot a graph. To that end, Fig. 1 shows the relationship between *Age* and *Debt* for the three subsample periods.

Fig. 1 shows that the pre-crises negative age/debt relationship during the GFC and the SDC (2008–2013 period) is much weaker, confirming our first hypothesis. Specifically, young firms show greater use of debt in the early years, but do so to a lesser extent during the crises. During financial crises SMEs submit themselves to bank monitoring to obtain

Table 4
The role of countries' financial development (**Hypothesis 2**).

	(1)	(2)	(3)
	Pre-crisis period	Crisis period	Post-crisis period
Age	0.007	−0.002	0.005
	(0.008)	(0.006)	(0.004)
Financial Development	0.160***	0.047***	0.032
	(0.015)	(0.010)	(0.033)
Age × Financial Development	−0.039***	0.000	−0.018***
	(0.005)	(0.006)	(0.004)
ROA	−0.212***	−0.096***	−0.094***
	(0.010)	(0.006)	(0.007)
Size	0.023***	0.021***	0.017***
	(0.009)	(0.006)	(0.003)
Tangibility	0.134***	0.193***	0.181***
	(0.024)	(0.030)	(0.020)
Cash Holdings	−0.258***	−0.278***	−0.244***
	(0.012)	(0.023)	(0.016)
Growth Opportunities	0.033**	0.025***	0.002
	(0.014)	(0.005)	(0.003)
GDP growth	0.002	0.000***	−0.004***
	(0.002)	(0.000)	(0.001)
Adjusted R^2	0.202	0.204	0.206
Observations	250,424	437,489	273,336

Notes: Year, country, industry fixed-effect dummies are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

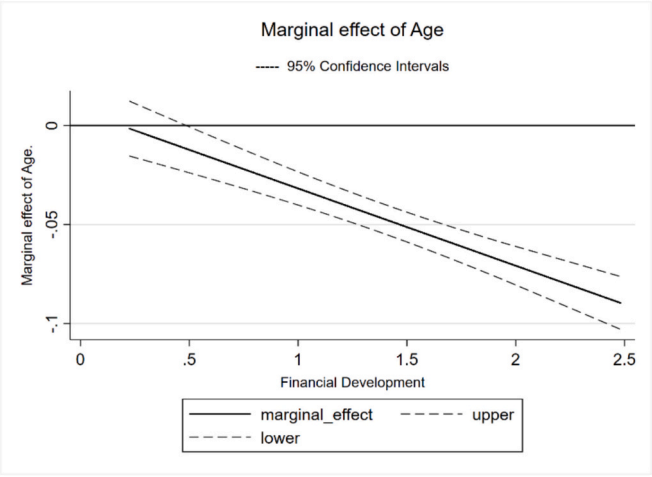

Fig. 2. Effect of age on debt in the **pre-crisis** period, according to different levels of financial development at the country level.

the necessary resources to fund their activities during difficult situations. Crisis periods make it difficult to generate cash resources internally, and thus SMEs are interested in debt financing. Moreover, during periods of turmoil we observe a different pattern compared to pre-crisis periods: the strong negative relationship between Age and Debt became almost flat.

Then, after the crises, despite the persistence of financial difficulties, the pattern tends to be similar to what was seen pre-crisis. This demonstrates that post-crisis financial market restrictions decrease and favour the return to the pre-crisis age/debt relationship. Fig. 1 shows the tendency to move back to the pre-crisis relationship, confirming our hypothesis. As expected, the post-crisis SME financial restrictions make the return to the pre-crisis pattern of younger SMEs more difficult.

Concerning our second hypothesis, we test whether SMEs operating in countries with well-developed financial systems have different age/debt relationships pre-, during and post-crisis. The results, which are

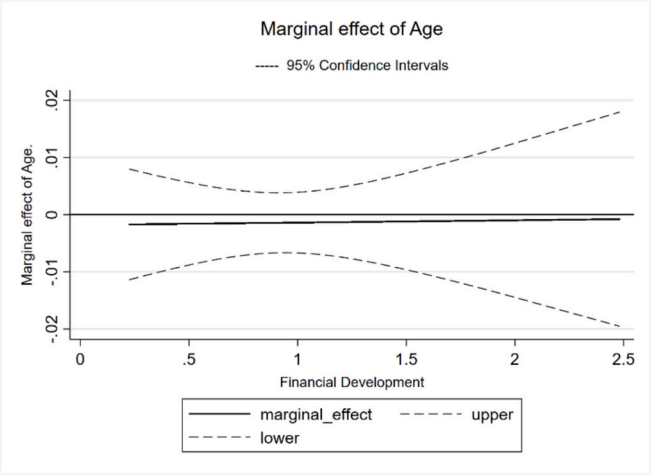

Fig. 3. Effect of age on debt in the **crisis** period, according to different levels of financial development at the country level.

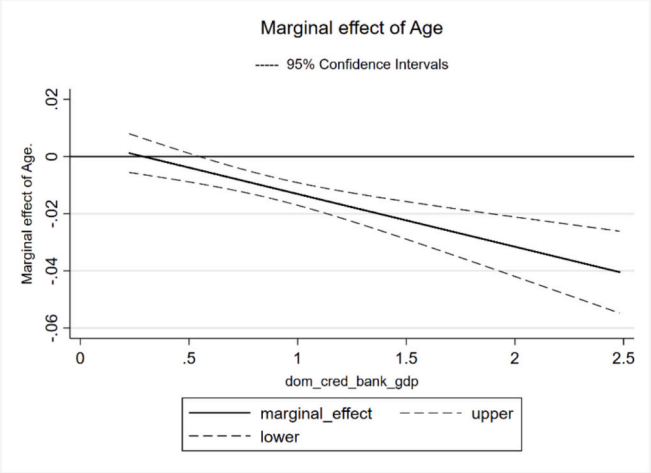

Fig. 4. Effect of age on debt in the **post-crisis** period, according to different levels of financial development at the country level.

reported in Table 4 and Figs. 2, 3 and 4, confirm the substantial impact of the level of development of the financial system as suggested in our second hypothesis pre- and post-crisis, while the moderating effect of countries' financial development is not statistically significant during the crisis period itself.

In general, the relationship in Figs. 2 and 4 is statistically significant for the vast majority of the sample, the confidence intervals only cross the zero line on a small part on the left of the figures, when Financial Development is lower than 0.498, concerning less than 14 % of firms in the entire sample. This indicates that the national financial context plays a role. In the pre-crisis period (Fig. 2), there is a stronger negative effect of Age on Debt for higher degrees of financial development. A well-developed financial system, which is able to provide better support for firms in need of funds, allows firms to maintain lower levels of indebtedness. Well-developed financial systems mitigate asymmetric information problems, making it easier to get rid of debt as the company ages.

However, during the crisis (Fig. 3) the role of financial development on the relationship between Age and Debt interestingly disappears; the confidence interval is inside the zero line. It seems that the strength of the crisis is such that it nullifies the role of financial system development on the age/debt relationship. Thus, we find that the presence of the crisis has a disruptive effect also on the influence of institutions for businesses. After the crisis (Fig. 4) we observe that there is a tendency to return to

pre-crisis patterns, with a decreasing trend corresponding to an increasing leve of financial development. This further demonstrates that the crisis plays a role by influencing the moderating effect of financial development.

6. Robustness and other tests

6.1. Other test: The role of industry's dependence on external finance

In this section we test the role of industry-specific factors, as firms encounter different debt choices, opportunities and constraints depending on their industry (Deloof & Vanacker, 2018; Garay et al., 2019; Harris & Raviv, 1991). Thus the financial life cycle and the role of crisis periods can be conditioned by the level of an industry's dependence on external finance (Cetorelli & Strahan, 2006) and on the external financial resources that each single industry requires (Rajan & Zingales, 1998). In keeping with Deloof and Vanacker (2018), we use the bank dependence variable measured as the median ratio of bank debt to total assets in four-digit industries calculated in non-crisis years. The regression results reported in Table A.10 suggest that the industry's dependence on external finance does not change the financial life patterns of SMEs and the effect of macroeconomic shocks on the financial life cycle.

6.2. Other test through a sample-period extension: The financial life cycle before, during and after the Covid crisis

Since the Covid emergency represents an important recent crisis (Cheema et al., 2022), we conducted an analysis to explore the similarities and differences between our results and those obtained using a sample of firms affected by the pandemic. We thus extended our database by collecting firm-level data and GDP for the countries examined up to 2023, resulting in a large sample of 4,464,897 firm-year observations. Then, we re-ran the regressions of our main model, creating three dummy variables for the pre-Covid period (2018–2019), the Covid period (2020−2021) and the post-Covid period (2022−2023). The results, presented in the new Table 5, confirm the existence of a negative relationship between firm age and debt. Additionally, they show that during the Covid crisis companies appear to rely on bank credit differently than during the GFC and the SDC. This behaviour may stem from the incentives provided to firms to use debt to address liquidity needs during the downturn, as highlighted by Fasano et al. (2022) and others. After the Covid crisis, the classic negative pattern is confirmed. Our results open new possibilities for studying firms' financial life cycles during the pandemic thanks to the availability of additional data in the coming years for a more comprehensive analysis.

To test the robustness of our findings[10] we provided many tests.

6.3. Robustness tests: Different dependent variable

We re-ran the main model using a different measure for the *Debt* variable, based on the natural logarithm of the total amount of debt. The outcome reported in Table A.6 in the appendix confirms our results.

6.4. Robustness tests: Control for stressed countries and year-by-year analysis

The European sovereign debt crisis (SDC), which emerged in the 2010s, marked a significant turning point in the economic landscape of the Eurozone. However, academic studies have increasingly emphasised the importance of making temporal distinctions when analysing the European sovereign debt crisis, particularly concerning the different phases and responses across European countries (Kosmidou et al., 2015). This highlights the difficulties in concretely assessing whether austerity measures in some countries were truly necessary to revive economic growth (Blyth, 2013; Heimberger, 2023; Konzelmann, 2014).

It therefore appears interesting to analyse the relationship between firm age and their debt levels, splitting the analysis by considering a subsample of countries (Greece, Ireland, Italy, Portugal and Spain) directly involved in the bailout plan and European financial assistance (Kosmidou et al., 2015). Thus, in Table A.7 in the appendix we investigate whether the debt/age relationship was changing in those five euro area countries where the sovereign crisis started. Indeed, as highlighted by Ferrando et al. (2019) and Kosmidou et al. (2015), the sovereign creditworthiness of Greece, Ireland, Italy, Portugal and Spain deteriorated significantly more than the other European countries. Then, we also created a sub-sample of SMEs from these most-affected countries, named “Crisis-Stressed Countries” (Panel B of Table A.8) and a subsample for others, named “No-Crisis Stressed Countries” (Panel C of Table A.8), showing for comparison also the results considering the whole sample (Panel A of Table A.8). If these five countries had a different age/debt relationship, even a year-by-year analysis from 2005 to 2016 should show at least a slightly different pattern. The results show a different pattern for Stressed and No-Stressed countries, suggesting the significance of the sovereign crisis.

6.5. Robustness tests: Is there a changing effect of a non-monotonic relationship between age and debt?

To test if our results are affected by an eventual non-monotonic effect, in Table A.9 we re-ran the regression of Table 3 and Table 4, introducing the squared term of Age (Age^2), as in La Rocca et al. (2011), and the relative interaction terms with the crisis and post-crisis dummies. Looking at Fig. A.5, we did not find any clear inverted U-shape relationship, just that the straight line becomes smoothly curvilinear. Thus, we found that imposing a non-monotonic model does not change the implications of our main results. The trends observed in our Figs. 1, 2 and 3 were confirmed, underscoring the validity of our hypotheses and implications.

6.6. Robustness tests: Endogeneity test and leave-one-out analysis

As in previous authoritative studies (e.g. Campbell et al., 2021; Roccapriore & Pollock, 2022), we accounted for endogeneity issues through the RIR technique of Busenbark et al. (2022). We used this technique because it controls not only for the problem of omitted variables but also for all possible biases arising from endogeneity. Indeed, this method evaluates the robustness of statistical inferences by systematically replacing observations with randomly generated data to test how sensitive the results are to specific data. Using the *konfound* command in Stata software in our main regression, the output highlights that the bias from endogeneity must be very large to invalidate the findings. In particular, we found that to invalidate the inference 95.08 % of the estimates would have to be due to bias. In other words, 95.08 % of the observations in our very large sample would have to be replaced to have any effect from endogeneity. This suggests that it is highly unlikely that our findings are influenced by endogeneity. Moreover, we performed the coefficient stability test of Oster (2019). We calculated the biased adjusted coefficient (β^*) under the assumption the coefficient of proportionality is $\delta = 0.5$, which assumes that unobserved factors weigh half as much as observed ones. Additionally, we conservatively used the very restrictive assumption that the maximum R-square (Rmax) equals unity. Since the adjusted β (−0.059) is very close to the observed value (−0.031) in our main model, it is highly unlikely that our results are affected by omitted variables.

Furthermore, we conducted the leave-one-out analysis, removing the countries with the highest number of observations one by one, namely Italy, Spain and France. In all three cases, we found that the results of

[10] Robustness regression results as well as the following further tests are available in the supplemental materials.

Table 5
Financial life cycle, capital structure and Covid crisis: regression results.

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample	Whole sample	Main Model (Whole sample)	Pre-Covid crisis period	Covid Crisis period	Post-Covid crisis period
Age	−0.020***	−0.021***	−0.016***	−0.016***	−0.027***	−0.027***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)
Dummy Covid Crisis		0.013***	0.036***			
		(0.002)	(0.002)			
Dummy Post-Covid		0.005***	0.041***			
Crisis		(0.002)	(0.003)			
Age × Dummy Covid			−0.009***			
Crisis			(0.001)			
Age × Dummy Post-Covid Crisis			−0.013***			
			(0.001)			
ROA	−0.110***	−0.110***	−0.110***	−0.108***	−0.118***	−0.099***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Size	0.006***	0.006***	0.006***	0.007***	0.006***	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Tangibility	0.127***	0.127***	0.127***	0.138***	0.120***	0.117***
	(0.017)	(0.017)	(0.017)	(0.018)	(0.016)	(0.015)
Cash Holdings	−0.136***	−0.137***	−0.137***	−0.138***	−0.132***	−0.144***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.006)	(0.007)
Growth Opportunities	−0.000	−0.000	−0.000	0.000*	−0.000	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth	−0.001*	−0.001***	−0.001**	−0.001*	−0.001***	−0.004***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Adjusted R^2	0.200	0.201	0.201	0.221	0.200	0.180
Observations	4,464,897	4,464,897	4,464,897	1,863,272	1,306,587	1,295,038

Notes: Year, country, industry fixed-effect dummies are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

our main model remained substantially unchanged. Moreover, we conducted additional robustness tests by lagging the variables *Cash Holdings* and *Growth Opportunities* (*Cash Holdings*(t-1) and *Growth Opportunities*(t-1)) to address potential endogeneity concerns. The results remained consistent with our findings, confirming the robustness of our analysis.

Finally, to ensure that the high number of observations does not influence the statistical significance of the results, we ran a placebo test. Specifically, we randomly re-shuffled the independent variable Age 100 times across firms and re-estimated the regression. We found that the estimated coefficient of the Age variable was insignificant in all 100 iterations, confirming the robustness of our findings.

7. Conclusions, implications and discussion

Many single-country studies suggest that financial life cycle theories can explain how a firm's life cycle is an important factor influencing SMEs' financing decisions. This work contributes to firms' financing theories by investigating the debt policies of SMEs throughout their life cycle, using a large international dataset of 28 European countries for the first time. In line with previous empirical contributions (e.g. Deloof & Vanacker, 2018; Hanssens et al., 2016; La Rocca et al., 2011; Robb & Robinson, 2014), we observe that young SMEs strongly rely on external debt despite the cost of financing typically being high for such firms. However, the importance of debt for SMEs decreases as they age. It seems that young SMEs seek to obtain certification of their quality and acquire credibility in the product market by submitting themselves to monitoring by banks. Moreover, these firms rebalance their capital structure during the middle and old phases of their life. As the SME matures, internal self-generated financial resources replace debt and the fraction of borrowing declines. This is due to a reduction in information opacity, as monitoring becomes secondary as the track record signals both quality and reliability.

We then investigated the impact of the 2008–2010 GFC and the 2011–2013 SDC on the financial policies of SMEs during their life stages. Specifically, we tested SMEs' financial behaviour pre-, during and post-crisis. The results highlight that at the time of the GFC (2008–2010) and the SDC (2011–2013) the debt/age relationship was less pronounced compared to the pre-crises pattern. After the crises, the age/debt relationship tends to return to pre-crises patterns, but to a lower extent for SMEs operating in countries with highly developed financial systems compared to those with a lower level of development. Thus, the financial life cycle is shaped by economic contingencies and SMEs are strongly influenced by the macroeconomic situation.

Our study also provides several suggestions for political guidelines. Although there are inevitably credit difficulties during crisis periods (Campello et al., 2010; Kahle & Stulz, 2013), during downturns, such as the recent coronavirus emergency, firms should obtain financial resources through bank lending to ensure their upturn.[11] Future studies might investigate the varying reactions of innovative and established firms to financial crises, as these two categories of companies could display different financial behaviours. Furthermore, a comparative examination between SMEs and large corporations would be valuable in determining whether the patterns identified are unique to SMEs or indicative of wider market trends. Governments and financial institutions are constantly seeking to develop concrete solutions for the financial constraint problems of small businesses, especially during crisis situations when financial decisions are crucial (Tavares et al., 2023). In doing so, they should carefully target their policies according to the stages of the SME life cycle, as the financial needs of a firm change over time. In this context, it is essential to consider the introduction of flexible credit lines, financing instruments that adapt to the phases of the economic cycle. These instruments would allow SMEs to increase their leverage during contractions and reduce it during recoveries. In addition, it is important to develop incentives to improve the financial resilience of SMEs, such as soft credit instruments that can alleviate the burden of debt during crisis periods. Furthermore, incentives could be developed for diversifying funding sources, supporting alternative finance such as venture capital, crowdfunding and peer-to-peer lending to reduce reliance on bank credit.

[11] Foroni et al. (2020) and Fasano and Deloof (2021) suggest that the investigation of the GFC could be informative for the recent Covid-19 crisis, considering that there could be similarities between the two crises.

In this context, this paper studied the financial behaviour of firms during crisis periods, hoping to provide insight to support firms in achieving a rapid economic recovery. According to our findings, for young European SMEs, which are those firms that are more subject to information opacity, debt played a more significant role during the past two financial crises. Thus, past practice suggests that a value-enhancing use of debt could be an excellent route out of the crisis. With this purpose in mind, governments and financial institutions should find the best form of credit to provide subsidised loans, paying attention to the changing financial needs of SMEs during their life cycles. It is thus important to develop specific credit instruments for each phase of a business. On the one hand, bank lending allows seizing growth opportunities or provides space to breathe in periods of negative contingencies. However, the interest due can undermine any possibility of enjoying the long-run benefits of debt. The cost of capital for a young firm seeking credibility in the financial market is likely to be very high. For this reason, it is essential to obtain favourable financing conditions. Interestingly, despite economic downturns and financial crises, and even during periods of extremely low interest rates, firms continue to exhibit a strong tendency to reduce debt levels as they age. The persistence of this behaviour may indicate a lack of understanding of finance among SME managers with respect to the advantages of debt financing. This is an additional potential strand of literature for future research.

Thus, governments and financial institutions should increase the availability of debt financing, especially for young and early-stage firms during crisis periods and support a campaign to raise awareness of the benefits related to the use of such debt.

Our results also suggest that financial system quality is a key enabler of SME resilience. Specifically, it seems particularly important to design subsidised loans for early-stage SMEs – especially in financially weaker systems – to reduce risk premiums and support access to debt. This can be done by encouraging partnerships with local banks and cooperative institutions that better understand SME needs. Additionally, it could be useful to foster diversification of funding sources, including fintech channels, to reduce dependence on traditional bank lending.

Future research could further explore the role of financial literacy and managerial knowledge in shaping SMEs' financing decisions, particularly in understanding why firms persistently avoid debt despite its potential advantages. From a firm-level point of view, managers of young SMEs in search of a confirmation of their quality should try to reduce the informational gap between their firm and financiers. This can be done also thanks to the role of local banks and credit cooperatives, which are often more willing to finance firms than large financial institutions. In line with the work of Cumming et al. (2019), our paper suggests the need for future research to investigate the issues associated with information asymmetries between entrepreneurs and financial stakeholders that vary over the life cycle of a firm. Future research that focuses on the relationship between debt and age should consider the macroeconomic (institutional) conditions in which a firm is embedded, as well as qualitative and quantitative information concerning the supply of finance, the quality of legal institutions and enforcement, the legal origin and culture. Another key area for research could examine the effects of financial crises in emerging economies or within financial markets that function under distinct structural conditions compared to those in Europe. The paper also provides direction for future studies that could further investigate the role of a non-financial macro-economic crisis such as the recent Covid-19 pandemic, especially in the coming years when financial data on firms will be more widely available after the Covid period.

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Appendix A. Appendix

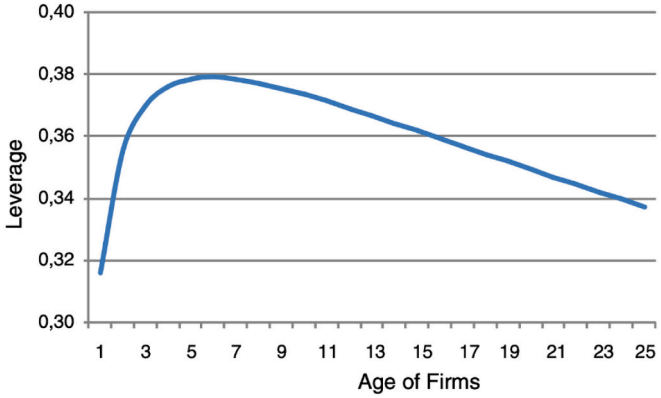

Fig. A.1. – Effect of age on debt as in La Rocca et al. (2011).

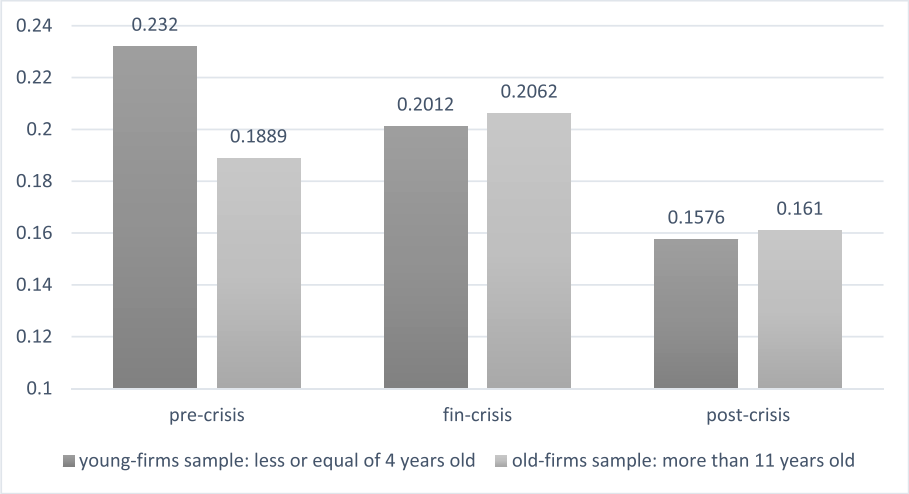

Fig. A.2. – Whole sample: Use of Debt for young and old SMEs pre-, during and post-crisis.

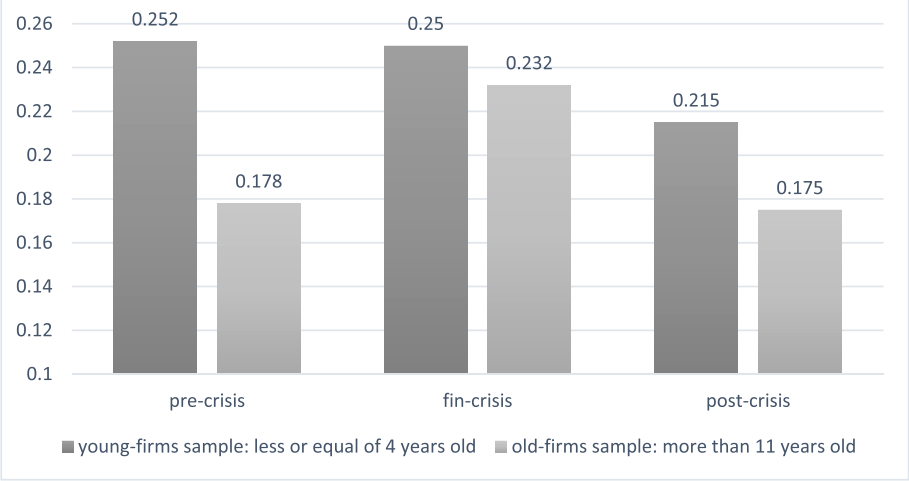

Fig. A.3. – *High* Financial Development sub-sample: Use of Debt for young and old SMEs pre-, during and post-crisis.

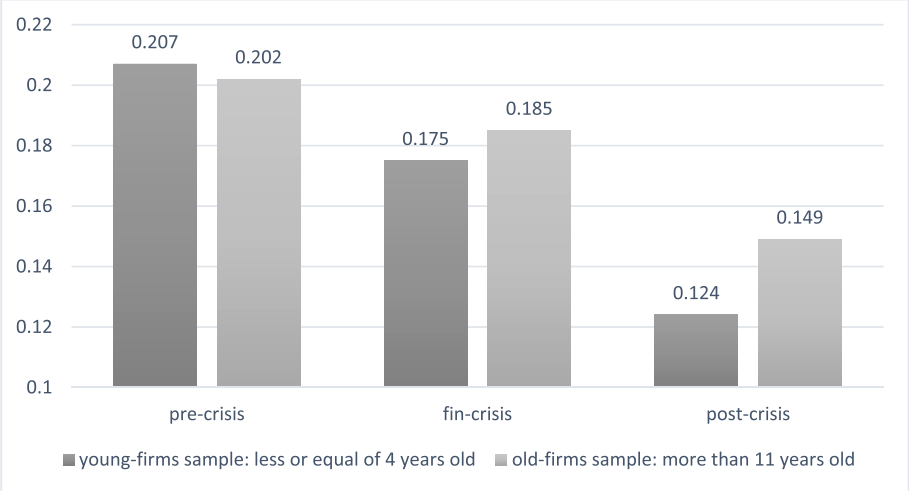

Fig. A.4. –*Low* Finanial Development sub-sample: Use of Debt for young and old SMEs pre-, during and post-crisis.

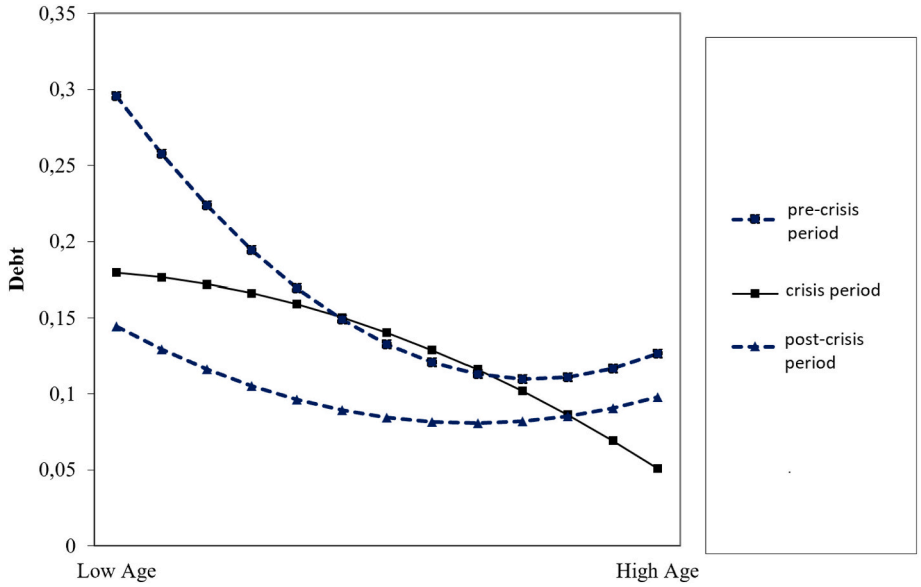

Fig. A.5. – Effect of age on debt pre-, during and post-crisis considering the **non-monotonic relationship between Age and Debt** (Age and Age^2).

Table A.1
– Description of variables.

Variable	Description	Source
ROA	EBIT / Total Assets	Orbis BvD
Tangibility	Tangible Assets / Total Assets	Orbis BvD
Size	ln(Total Assets)	Orbis BvD
Cash Holdings	Cash + Cash equivalents / Total Assets	Orbis BvD
Growth opportunities	(Sales $_t$ – Sales $_{t-1}$) / Sales $_{t-1}$	Orbis BvD
GDP Growth	(GDP $_t$ – GDP $_{t-1}$) / GDP $_{t-1}$	Italian National Institute of Statistics

Table A.2
– Mean value of Debt for each country in the sample.

n.	Country	mean	n.	Country	mean	n.	Country	mean
1	Austria	0.167	11	Hungary	0.191	21	Portugal	0.290
2	Belgium	0.176	12	Iceland	0.333	22	Republic of Moldova	0.172
3	Bosnia and Herzegovina	0.185	13	Ireland	0.330	23	Serbia	0.206
4	Croatia	0.219	14	Italy	0.188	24	Slovakia	0.110
5	Czech Republic	0.120	15	Latvia	0.242	25	Slovenia	0.287
6	Estonia	0.251	16	Lithuania	0.256	26	Spain	0.234
7	Finland	0.231	17	Luxembourg	0.088	27	Ukraine	0.067
8	France	0.117	18	Montenegro	0.184	28	UK	0.292
9	Germany	0.244	19	Netherlands	0.241			
10	Greece	0.230	20	Norway	0.227			

Table A.3
– Mean value of *Debt* across industries.

Industry	Debt
Agriculture Forestry and Fishing	0.254
Mining and Quarrying	0.220
Food Drink and Tobacco Industry	0.258
Textile and Clothing B,Industry	0.184
Paper and Allied Products	0.235
Printing, and Publishing	0.230
Manufacture Refined Petroleum	0.237
Chemical and Pharmaceutical	0.229
Manufacture of Metal Products	0.203
Manufacture of Non Metallic Products	0.221

(*continued on next page*)

Table A.3 (*continued*)

Industry	Debt
Mechanical Electrics Electronics	0.182
Other Manufacturing	0.166
Water Sewerage Waste Management	0.265
Construction	0.203
ICT	0.139
Transportation and Storage	0.187

Table A.4
– Mean value of Debt per five-year age group.

	Age groups (range of years)										
	<5	5–10	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	+50
Debt	0.196	0.209	0.197	0.183	0.174	0.176	0.178	0.175	0.174	0.172	0.134

Table A.5
– Countries sorted in two sub-sample of high and low financial development, according to median value in the pre-crisis year (2007). Median value is 0.815 (Italy).

High Financially Developed Countries (527,090 observations)		*Low Financially Developed Countries (434,159 observations)*	
1	Austria	1	Belgium
2	Estonia	2	Bosnia and Herzegovina
3	France	3	Croatia
4	Germany	4	Czech Republic
5	Greece	5	Finland
6	Luxembourg	6	Hungary
7	Netherlands	7	Italy
8	Norway	8	Iceland
9	Portugal	9	Ireland
10	Spain	10	Latvia
11	United Kingdom	11	Lithuania
		12	Montenegro
		13	Republic of Moldova
		14	Serbia
		15	Slovakia
		16	Slovenia
		17	Ukraine

Table A.6
- Robustness test: financial life cycle, capital structure and crisis using results **ln(Debt)** as dependent variable.

	(1)	(2)	(3)	(4)	(5)	(6)
	Whole sample	Whole sample	Whole sample	Pre-crisis period	Crisis period	Post-crisis period
Age	0.006	0.029	−0.084**	−0.160***	0.195***	−0.063***
	(0.025)	(0.023)	(0.038)	(0.043)	(0.022)	(0.020)
Dummy Crisis period		−0.221***	−0.810***			
		(0.022)	(0.091)			
Dummy Post-crisis period		−0.454***	−0.692***			
		(0.035)	(0.092)			
Age × Dummy Crisis			0.276***			
			(0.042)			
Age × Dummy Post-Crisis			0.095***			
			(0.032)			
Adjusted R^2	0.349	0.352	0.353	0.399	0.334	0.331
Observations	961,249	961,249	961,249	250,424	437,489	273,336

Notes: Year, country and industry fixed effects and control variables are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

Table A.7
- Results from Table 7 column (3), regarding Hypothesis 1 considering **Stressed countries** (column 1), concerning countries directly affected by the Sovereign crisis (Italy, Spain, Ireland, Greece and Portugal), and **No-Stressed countries** (column 2).

	(1)	(2)
	Stressed country sample	No-Stressed country sample
Age	−0.036***	−0.028***
	(0.007)	(0.003)
Dummy Crisis period	−0.095***	−0.009
	(0.015)	(0.010)
Dummy Post-crisis period	−0.086***	−0.020**
	(0.015)	(0.009)
Age × Dummy Crisis	0.046***	0.005
	(0.009)	(0.004)
Age × Dummy Post-Crisis	0.024***	0.004
	(0.005)	(0.003)
Adjusted R^2	0.176	0.245
Observations	563,300	397,949

Notes: Year, country and industry fixed effects and control variables are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

Table A.8
- Financial life cycle, capital structure and crisis: year-by-year results for whole sample, a crisis-stressed sample of countries (Italy, Spain, Ireland, Greece and Portugal) and a sample of no-crisis stressed countries.

Panel A - Whole sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Age	−0.035***	−0.036***	−0.024***	−0.020***	−0.010***	−0.007**	0.005	0.009**	0.014***	0.012***	−0.011***	−0.014***
	(0.006)	(0.006)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)
Adjusted R^2	0.205	0.195	0.213	0.209	0.214	0.204	0.205	0.202	0.204	0.208	0.200	0.221
Observations	84,904	93,956	71,564	69,943	67,438	68,812	76,837	76,997	77,462	75,833	106,416	91,087

Panel B - Crisis-stressed countries sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Age	−0.041***	−0.039***	−0.023***	−0.014***	−0.003	0.002	0.014***	0.019***	0.026***	0.024***	−0.005***	−0.012***
	(0.008)	(0.008)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)	(0.004)	(0.005)	(0.004)	(0.002)	(0.002)
Adjusted R^2	0.186	0.191	0.160	0.184	0.180	0.164	0.171	0.178	0.186	0.188	0.170	0.189
Observations	54,244	60,875	35,473	43,864	40,829	40,384	48,202	47,586	46,397	45,397	57,410	42,639

Panel C – No-Crisis Stressed countries sample

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Age	−0.027***	−0.030***	−0.024***	−0.034***	−0.028***	−0.023***	−0.017***	−0.014***	−0.011***	−0.009***	−0.023***	−0.020***
	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.004)	(0.003)	(0.003)	(0.003)
Adjusted R^2	0.257	0.236	0.238	0.250	0.264	0.264	0.275	0.259	0.249	0.255	0.245	0.250
Observations	30,660	33,081	36,091	26,079	26,609	28,428	28,635	29,411	31,065	30,436	49,006	48,448

Notes: For a description of the variables see Table A.1. Year, country, industry fixed effects and control variables are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

Table A.9
– Main regression results considering the potential non-monotonic effect of age on debt: including **Age squared** in the regression model (Hypotheses 1).

	(1)	(5)	(2)	(3)	(4)
	Whole sample	Whole sample	Pre-crisis period	Crisis period	Post-crisis period
Age	0.024***	−0.047***	−0.032***	0.090***	0.033***
	(0.006)	(0.007)	(0.008)	(0.009)	(0.005)
Age × Dummy Crisis		0.136***			
		(0.012)			
Age × Dummy Post-Crisis		0.080***			
		(0.008)			
Age2	−0.008***	0.003*	−0.000	−0.027***	−0.009***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)
Age2 × Dummy Crisis		−0.030***			
		(0.003)			
Age2 × Dummy Post-Crisis		−0.013***			
		(0.001)			
Adjusted R^2	0.201	0.202	0.199	0.205	0.207
Observations	961,249	961,249	250,424	437,489	273,336

Notes: Year, country and industry fixed effects and control variables are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

Table A.10
Life cycle and capital structure: regression results considering the moderating effect of Bank dependence by Deloof and Vanacker.

	(1)	(2)	(3)	(4)
	Whole sample	pre-crisis period	crisis period	post-crisis period
Age	−0.018***	−0.035***	0.002	−0.010***
	(0.004)	(0.006)	(0.003)	(0.002)
Age × Bank Dependence	−0.005**	0.005	−0.015***	−0.007***
	(0.002)	(0.005)	(0.004)	(0.002)
ROA	−0.115***	−0.210***	−0.096***	−0.093***
	(0.007)	(0.010)	(0.006)	(0.007)
Size	0.021***	0.023***	0.020***	0.017***
	(0.006)	(0.009)	(0.006)	(0.003)
Tangibility	0.180***	0.137***	0.193***	0.182***
	(0.026)	(0.025)	(0.030)	(0.020)
Cash Holdings	−0.268***	−0.260***	−0.278***	−0.244***
	(0.018)	(0.012)	(0.023)	(0.016)
Growth Opportunities	0.010*	0.038***	0.025***	0.002
	(0.005)	(0.014)	(0.006)	(0.003)
GDP growth	−0.001***	0.002	0.000***	−0.003***
	(0.000)	(0.002)	(0.000)	(0.000)
Adjusted R^2	0.198	0.199	0.204	0.205
Observations	961,249	250,424	437,489	273,336

Notes: Bank dependence is measured according to Deloof and Vanacker (2018) as the median ratio of bank debt to total assets in four-digit industries calculated in non-crisis years. Year, country and industry fixed effects are included in the model. Robust standard errors clustered by country and industry are reported in brackets. ***: denotes significance at the 1 % level; **: denotes significance at the 5 % level; *: denotes significance at the 10 % level.

Table A.11
- Alternative theoretical approaches concerning the financial life-cycle.

Financial Life-cycle Approach & ***Reputation Effect Argument***: Fluck (2000), Kaplan and Stromberg (2003).	***Reverse Financial Life-cycle Approach*** & ***Certification Effect Argument***: Petersen and Rajan (1994), Diamond (1991).
A life-cycle pattern of firm financing assumes that young firms, without past experience and a track record that are particularly sensitive to asymmetric information problems, will use outside equity first (such as venture capital finance) and retained earnings, issuing debt to satisfy their subsequent financing needs in the maturity stage. Young firms have a low debt capacity, while debt becomes convenient in the maturity stage.	*v* Young firms rely on the closest sources of financing, i.e., family capital and bank capital based on family pledges. These firms seek to obtain certification of their quality and acquire credibility in the product market by submitting themselves to monitoring by banks. Firms rebalance their capital structure at the maturity stage. As the firm matures, internal self-generated financial resources substitute debt and the fraction of borrowing declines. At the same time, monitoring becomes secondary as the track record signals both quality and reliability, and the debt level declines.

Data availability

No

References

Abuhommous, A. A. A. (2023). Corporate life cycle and credit scoring. *Journal of Applied Economics, 26*(1), Article 2255444.

Adjei, F. (2012). Debt dependence and corporate performance in a financial crisis: Evidence from the sub-prime mortgage crisis. *Journal of Economics and Finance, 36*, 176–189.

Albertazzi, U., Ropele, T., Sene, G., & Signoretti, F. M. (2014). The impact of the sovereign debt crisis on the activity of Italian banks. *Journal of Banking & Finance, 46*, 387–402.

Allen, F., Gu, X., & Kowalewski, O. (2018). Financial structure, economic growth and development. In *Handbook of finance and development* (pp. 31–62). Edward Elgar Publishing.

Anginer, D., Demirgüç-Kunt, A., & Mare, D. S. (2020). Bank capital and risk in Europe and Central Asia ten years after the crisis. *World Bank Policy Research, 9138*.

Annan, A., Ciccotello, C. S., & Rioja, F. (2024). Sources of funding and performance of microfinance institutions over the life cycle. *International Review of Financial Analysis, 95*, Article 103415.

Antzoulatos, A., Koufopoulos, K., Lambrinoudakis, C., & Tsiritakis, E. (2016). Supply of capital and capital structure: The role of financial development. *Journal of Corporate Finance, 38*, 166–195.

Armanious, A., & Zhao, R. (2024). Stock liquidity effect on leverage: The role of debt security, financial constraint, and risk around the global financial crisis and Covid-19 pandemic. *International Review of Financial Analysis, 92*, Article 103093.

Arthur, N., Tang, Q., & Lin, Z. S. (2015). Corporate accruals quality during the 2008–2010 global financial crisis. *Journal of International Accounting, Auditing and Taxation, 25*, 1–15.

Basha, S. A., Bennasr, H., & Goaied, M. (2023). Financial literacy, financial development, and leverage of small firms. *International Review of Financial Analysis, 86*, Article 102510.

Batrancea, L. M., Rathnaswamy, M. M., Rus, M. I., & Tulai, H. (2023). Determinants of economic growth for the last half of century: A panel data analysis on 50 countries. *Journal of the Knowledge Economy, 14*(3), 2578–2602.

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance, 30*(11), 2931–2943.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2008). Financing patterns around the world: Are small firms different? *Journal of Financial Economics, 89*(3), 467–487.

Beck, T., Demirgüç-Kunt, A., & Pería, M. S. M. (2011). Bank financing for SMEs: Evidence across countries and bank ownership types. *Journal of Financial Services Research, 39*, 35–54.

Becker, B., & Ivashina, V. (2018). Financial repression in the European sovereign debt crisis. *Review of Finance, 22*(1), 83–115.

Berger, A., & Udell, G. (1998). The economics of small business finance: The roles of private equity and debt Markets in the Financial Growth Cycle. *Journal of Banking and Finance, 22*(6–8), 613–673.

Blyth, M. (2013). *Austerity: The history of a dangerous idea*. Oxford University Press.

Bolton, P., & Freixas, X. (2000). Equity, bonds, and bank debt: Capital structure and financial market equilibrium under asymmetric information. *Journal of Political Economy, 108*(2), 324–351.

Brown, R., & Lee, N. (2019). Strapped for cash? Funding for UK high growth SMEs since the global financial crisis. *Journal of Business Research, 99*, 37–45.

Bulan, L. T., & Yan, Z. (2009). The pecking order theory and the firm's life cycle. *Banking and Finance Letters, 1*(3).

Busenbark, J., Yoon, H., Gamache, D., & Withers, M. (2022). Omitted variable Bias: Examining management research with the impact threshold of a confounding variable (ITCV). *Journal of Management, 48*(1), 17–48. https://doi.org/10.1177/01492063211006458

Campbell, R. J., Busenbark, J. R., Graffin, S. D., & Boivie, S. (2021). Retaining problems or solutions? The post-acquisition performance implications of director retention. *Strategic Management Journal, 42*(9), 1716–1733. https://doi.org/10.1002/smj.3321

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of Financial Economics, 97*(3), 470–487.

Carbo-Valverde, S., Rodriguez-Fernandez, F., & Udell, G. (2016). Trade credit, the financial crisis, and SME access to finance. *Journal of Money, Credit and Banking, 48*(1), 113–143.

Casey, E., & O'Toole, C. (2014). Bank lending constraints, trade credit and alternative financing during the financial crisis: Evidence from European SMEs. *Journal of Corporate Finance, 27*, 173–193.

Castaldo, A., Pittiglio, R., Reganati, F., & Sarno, D. (2023). Access to bank financing and start-up resilience: A survival analysis across business sectors in a time of crisis. *The Manchester School, 91*(3), 141–170.

Cetorelli, N., & Strahan, P. (2006). Finance as a barrier to entry: Bank competition and industry structure in local US markets. *The Journal of Finance, 61*(1), 437–461.

Cheema, M. A., Faff, R., & Szulczyk, K. R. (2022). The 2008 global financial crisis and COVID-19 pandemic: How safe are the safe haven assets? *International Review of Financial Analysis, 83*, Article 102316.

Chortareas, G., Magkonis, G., & Zekente, K. M. (2020). Credit risk and the business cycle: What do we know? *International Review of Financial Analysis, 67*, Article 101421.

Claessens, M. S., & Kose, M. A. (2013). *Financial crises explanations, types, and implications*.

Cole, R. A., & Sokolyk, T. (2018). Debt financing, survival, and growth of start-up firms. *Journal of Corporate Finance, 50*, 609–625.

Cosh, A., Cumming, D., & Hughes, A. (2009). Outside Entrepreneurial capital. *The Economic Journal, 119*(540), 1494–1533.

Cowling, M., Liu, W., & Ledger, A. (2012). Small business financing in the UK before and during the current financial crisis. *International Small Business Journal, 30*(7), 778–800.

Cowling, M., Liu, W., & Zhang, N. (2018). Did firm age, experience, and access to finance count? SME performance after the global financial crisis. *Journal of Evolutionary Economics, 28*, 77–100.

Cumming, D., Deloof, M., Manigart, S., & Wright, M. (2019). New directions in entrepreneurial finance. *Journal of Banking and Finance, 100*, 252–260.

D'Amato, A. (2020). Capital structure, debt maturity, and financial crisis: Empirical evidence from SMEs. *Small Business Economics, 55*(4), 919–941.

Damodaran, A. (2007). *Corporate finance: Theory and practice*. John Wiley & Sons.

Davis, E. P., Armstrong, A., Rienzo, C., & Liadze, I. (2013). *Evaluating changes in bank lending to UK SMEs over 2001–12; ongoing tight credit?* Department for Business Innovation and Skills.

Deloof, M., La Rocca, M., & Vanacker, T. (2019). Local banking development and the use of debt financing by new firms. *Entrepreneurship Theory and Practice, 43*(6), 1250–1276.

Deloof, M., & Vanacker, T. (2018). The recent financial crisis, start-up financing and survival. *Journal of Business Finance & Accounting, 45*(7–8), 928–951.

Demirgüç-Kunt, A., Peria, M. S. M., & Tressel, T. (2020). The global financial crisis and the capital structure of firms: Was the impact more severe among SMEs and non-listed firms? *Journal of Corporate Finance, 60*, Article 101514.

Diamond, D. (1991). Debt maturity structure and liquidity risk. *Quarterly Journal of Economics, 106*(3), 709–737.

Dorsman, A., & Gounopoulos, D. (2013). European sovereign debt crisis and the performance of Dutch IPOs. *International Review of Financial Analysis, 30*, 308–319.

Dottori, D., Micucci, G., & Sigalotti, L. (2024). Trade debts and bank lending in years of crisis. *International Review of Financial Analysis, 92*, Article 103082.

Driver, C., & Muñoz-Bugarin, J. (2019). Financial constraints on investment: Effects of firm size and the financial crisis. *Research in International Business and Finance, 47*, 441–457.

Drobetz, W., & Wanzenried, G. (2006). What determines the speed of adjustment to the target capital structure? *Applied Financial Economics, 16*(13), 941–958.

European Central Bank. (2024 November). *Survey on the access to finance of enterprises (SAFE). Retrieved in March 2025 from ECB. 2024*.

Fan, J., Titman, S., & Twite, G. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and Quantitative Analysis, 47*(1), 23–56.

Fasano, F., & Cappa, F. (2022). How do banking fintech services affect SME debt? *Journal of Economics and Business, 121*, Article 106070.

Fasano, F., & Deloof, M. (2021). Local financial development and cash Holdings in Italian SMEs. *International Small Business Journal, 39*(8).

Fasano, F., & La Rocca, T. (2023). Does the bank-firm human relationship still matter for SMEs? The game-changing role of digitalization. *Small Business Economics*, 1–20.

Fasano, F., Rocca, M. L., & Neha, N. (2023). How to manage the debt of shipping companies? A European analysis. *International Journal of Shipping and Transport Logistics, 16*(3–4), 277–289.

Fasano, F., Sánchez-Vidal, F. J., & La Rocca, M. (2022). The role of government policies for Italian firms during the COVID-19 crisis. *Finance Research Letters, 50*, Article 103273.

Fee, C. E., Hadlock, C. J., & Pierce, J. R. (2009). Investment, financing constraints, and internal capital markets: Evidence from the advertising expenditures of multinational firms. *The Review of Financial Studies, 22*(6), 2361–2392.

Ferrando, A., Pal, R., & Durante, E. (2019). Financing and obstacles for high growth enterprises: the European case. *EIB*, 2019/03.

Ferrando, A., Popov, A., & Udell, G. (2017). Sovereign stress and SMEs' access to finance: Evidence from the ECB'S SAFE survey. *Journal of Banking and Finance, 81*, 65–80.

Fluck, Z. (2000). Capital structure decisions in small and large firms: A life-cycle theory of financing. In *NYU working paper no. FIN-00-028*. https://ssrn.com/abstract=1295232.

Fornari, F., Stracca, L., & Gürkaynak, R. S. (2012). What does a financial shock do? First international evidence. *Economic Policy, 27*(71), 407–445.

Foroni, C., Marcellino, M., & Stevanovic, D. (2020). Forecasting the Covid-19 recession and recovery: Lessons from the financial crisis. *International Journal of Forecasting, 38*(2), 596–612.

Fort, T. C., Haltiwanger, J., Jarmin, R. S., & Miranda, J. (2013). How firms respond to business cycles: The role of firm age and firm size. *IMF Economic Review, 61*(3), 520–559.

Fosu, S., Danso, A., Ahmad, W., & Coffie, W. (2016). Information asymmetry, leverage and firm value: Do crisis and growth matter? *International Review of Financial Analysis, 46*, 140–150.

Gabrielli, A., & Greco, G. (2023). Tax planning and financial default: Role of corporate life cycle. *Management Decision, 61*(13), 321–355.

Gambacorta, L., Hofmann, B., & Peersman, G. (2014). The effectiveness of unconventional monetary policy at the zero lower bound: A cross-country analysis. *Journal of Money, Credit and Banking, 46*(4), 615–642.

Garay, U., González, M., & Rosso, J. (2019). Country and industry effects in corporate bond spreads in emerging markets. *Journal of Business Research, 102*, 191–200.

Ge, Y., & Qiu, J. (2007). Financial development, bank discrimination and trade credit. *Journal of Banking & Finance, 31*(2), 513–530.

Giannetti, M. (2003). Do better Insitutions mitigate agency problems? Evidence from corporate finance choices. *Journal of Financial and Quantitative Analysis, 38*(1), 185–212.
Gkillas, K., Konstantatos, C., Floros, C., & Tsagkanos, A. (2021). Realized volatility spillovers between US spot and futures during ECB news: Evidence from the European sovereign debt crisis. *International Review of Financial Analysis, 74*, Article 101706.
Grant, W., & Wilson, G. K. (2012). *Consequences of the global financial crisis* (p. 287). Oxford University Press.
Habib, A., & Hasan, M. M. (2019). Corporate life cycle research in accounting, finance and corporate governance: A survey, and directions for future research. *International Review of Financial Analysis, 61*, 188–201.
Hadlock, C., & Pierce, J. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. *The Review of Financial Studies, 23*(5), 1909–1940.
Hanssens, J., Deloof, M., & Vanacker, T. (2016). The evolution of debt policies: New evidence from business start-ups. *Journal of Banking and Finance, 65*, 120–133.
Harris, M., & Raviv, A. (1991). The theory of capital structure. *The Journal of Finance, 45*(1), 297–355.
Heimberger, P. (2023). Do higher public debt levels reduce economic growth? *Journal of Economic Surveys, 37*(4), 1061–1089.
Hirsch, J., & Walz, U. (2011). Financing decisions along a firm's life-cycle: Debt as a commitment device. *European Financial Management, 17*(5), 898–927.
Hoberg, G., & Maksimovic, V. (2022). Product life cycles in corporate finance. *The Review of Financial Studies, 35*(9), 4249–4299.
Holmstrom, B., & Tirole, J. (1997). Financial intermediation, loanable funds, and the real sector. *The Quarterly Journal of Economics, 112*, 663–691.
Hoque, H. (2013). From the credit crisis to the sovereign debt crisis: Determinants of share price performance of global banks. *International Review of Financial Analysis, 30*, 334–350.
Hu, H., Jia, Z., & Yang, S. (2025). Exploring FinTech, green finance, and ESG performance across corporate life-cycles. *International Review of Financial Analysis, 97*, Article 103871.
Ivashina, V., Scharfstein, D., & Stein, J. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics, 97*, 319–338.
Kahle, K. M., & Stulz, R. M. (2013). Access to capital, investment, and the financial crisis. *Journal of Financial Economics, 110*(2), 280–299.
Kalemli-Özcan, Ş., Reinhart, C., & Rogoff, K. (2016). Sovereign debt and financial crises: Theory and historical evidence. *Journal of the European Economic Association, 14*(1), 1–6.
Kaplan, S., & Stromberg, P. (2003). Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *The Review of Economic Studies, 70*(2), 281–315.
Keasey, K., Martinez, B., & Pindado, J. (2015). Young family firms: Financing decisions and the willingness to dilute control. *Journal of Corporate Finance, 34*, 47–63.
Khemka, G., Steffensen, M., & Warren, G. J. (2021). How sub-optimal are age-based life-cycle investment products? *International Review of Financial Analysis, 73*, Article 101619.
Klein, M., Neitzert, F., Hartmann-Wendels, T., & Kraus, S. (2019). Start-up financing in the digital age: A systematic review and comparison of new forms of financing. *The Journal of Entrepreneurial Finance (JEF), 21*(2), 46–98.
Konzelmann, S. (2014). The political economics of austerity. *Cambridge Journal of Economics, 38*(4), 701–741.
Kosmidou, K. V., Kousenidis, D. V., & Negakis, C. I. (2015). The impact of the EU/ECB/IMF bailout programs on the financial and real sectors of the ASE during the Greek sovereign crisis. *Journal of Banking & Finance, 50*, 440–454.
Kraus, A., & Litzenberger, R. (1973). A state of preference model of optimal financial leverage. *The Journal of Finance, 28*, 911–922.
La Rocca, M., La Rocca, T., & Cariola, A. (2011). Capital structure decisions during a firm's life cycle. *Small Business Economics, 37*(1), 107–130.
La Rocca, M., Staglianò, R., La Rocca, T., Cariola, A., & Skatova, E. (2019). Cash holdings and SME performance in Europe: The role of firm-specific and macroeconomic moderators. *Small Business Economics, 53*, 1051–1078.
Lane, P. (2012). The European sovereign debt crisis. *Journal of Economic Perspectives, 26*(3), 49–68.
Leary, M. T. (2009). Bank loan supply, lender choice, and corporate capital structure. *The Journal of Finance, 64*(3), 1143–1185.
Levine, R. (2005). Finance and growth: Theory and evidence. In *, 1. Handbook of economic growth* (pp. 865–934).
Li, W., Wang, X., & Zhang, H. (2024). The role of distance and financial development: Evidence from international financial markets. *International Review of Financial Analysis, 92*, Article 103108.
Love, I., & Martínez Pería, M. S. (2015). How bank competition affects firms' access to finance. *The World Bank Economic Review, 29*(3), 413–418.
Mac an Bhaird, C.. (2013). Demand for debt and equity before and after the financial crisis. *Research in International Business and Finance, 28*, 105–117.
Mac an Bhaird, C., & Lucey, B. (2011). An empirical investigation of the financial growth lifecycle. *Journal of Small Business and Enterprise Development, 18*(4), 715–731.
Machokoto, M., Areneke, G., & Ibrahim, B. M. (2020). Rising corporate debt and value relevance of supply-side factors in South Africa. *Journal of Business Research, 109*, 26–37.
Martinez, M. G., Zouaghi, F., Marco, T. G., & Robinson, C. (2019). What drives business failure? Exploring the role of internal and external knowledge capabilities during the global financial crisis. *Journal of Business Research, 98*, 441–449.
Michaelas, N., Chittenden, F., & Poutziouris, P. (1999). Financial policy and capital structure choice in UK SMEs: Empirical evidence from company panel data. *Small Business Economics, 12*, 113–130.
Mueller, D. C. (1972). A life cycle theory of the firm. *The Journal of Industrial Economics*, 199–219.
Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187–221.
Oster, E. (2019). Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics, 37*(2), 187–204.
Palacín-Sánchez, M. J., Ramírez-Herrera, L. M., & Di Pietro, F. (2013). Capital structure of SMEs in Spanish regions. *Small Business Economics, 41*, 503–519.
Petersen, M., & Rajan, R. (1994). The benefits of lending relationships: Evidence from small business data. *The Journal of Finance, 49*(1), 3–37.
Pianeselli, D., & Zaghini, A. (2014). The cost of firms' debt financing and the global financial crisis. *Finance Research Letters, 11*(2), 74–83.
Poeschl, J. (2023). Corporate debt maturity and investment over the business cycle. *European Economic Review, 152*, Article 104348.
Psillaki, M., & Eleftheriou, K. (2014). Trade credit, Bank credit, and flight to quality: Evidence from French SMEs. *Journal of Small Business Management, 53*(4), 1219–1240.
Rajan, R., & Zingales, L. (1998). Financial dependence and growth. *American Economic Review, 88*(3), 559–586.
Riley, R., Rosazza-Bondibene, C., & Young, G. (2014). The financial crisis, bank lending and UK productivity: Sectoral and firm-level evidence. *National Institute Economic Review, 228*, R17–R34.
Robb, A., & Robinson, D. (2014). The capital structure decisions of new firms. *Review of Financial Studies, 27*(1), 153–179.
Roccapriore, A. Y., & Pollock, T. (2022). I Don't need a degree, I've got ABS: Influencer warmth and competence, communication mode, and stakeholder engagement on social media. *Academy of Management Journal, 66*(3), 979–1006.
Sanchez-Vidal, J., & Martín-Ugedo, F. (2012). Are the implications of the financial growth cycle confirmed for Spanish SMEs? *Journal of Business Economics and Management, 13*(4), 637–665.
Saona, P., Vallelado, E., & San Martín, P. (2020). Debt, or not debt, that is the question: A Shakespearean question to a corporate decision. *Journal of Business Research, 115*, 378–392.
Serrasqueiro, Z., & Nunes, P. (2012). Is age a determinant of SMEs' financing decisions? Empirical evidence using panel data models. *Entrepreneurship Theory and Practice, 36*(4), 627–654.
Stamatopoulos, T. V., Arvanitis, S. E., & Terzakis, D. M. (2017). The risk of the sovereign debt default: The Eurozone crisis 2008–2013. *Applied Economics, 49*(38), 3782–3796.
Tang, G., & Upper, C. (2010). Debt reduction after crises. In *BIS quarterly review*. September.
Tavares, F., Santos, E., Vasconcelos, M. V. D., & Tavares, V. C. (2023). A statistical analysis of companies' financing strategies in Portugal during the COVID-19 pandemic. *Journal of Risk and Financial Management, 16*(2), 116.
Tirole, J. (2010). *The theory of corporate finance*. Princeton University Press.
Vermoesen, V., Deloof, M., & Laveren, E. (2013). Long-term debt maturity and financing constraints of SMEs during the global financial crisis. *Small Business Economics, 41*, 433–448.
Yazdanfar, D., & Ohman, P. (2015). Debt financing and firm performance: an empirical study based on Swedish data. *The Journal of Risk Finance, 16*(1), 102–118.
Ylhäinen, I. (2017). Life-cycle effects in small business finance. *Journal of Banking & Finance, 77*, 176–196.
Zhu, B., Liang, C., Mirza, N., & Umar, M. (2023). What drives gearing in early-stage firms? Evidence from blue economy startups. *Journal of Business Research, 161*, Article 113840.
Zubair, S., Kabir, R., & Huang, X. (2020). Does the financial crisis change the effect of financing on investment? Evidence from private SMEs. *Journal of Business Research, 110*, 456–463.