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The zero-debt puzzle in BRICS countries: Disentangling the financial flexibility and financial constraints hypotheses

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ABSTRACT

This study analyzes the zero-debt decisions of BRICS firms using a bivariate probit model. The leading hypotheses are financial flexibility and financial constraints. On the demand-side, our findings reveal that managerial debt aversion, early lifecycle stage, growth opportunities, solvency, and concentrated ownership contribute to the lack of debt. Similarly, a country's institutional quality correlates with firms' debt-free status. On the supply-side, creditors fund companies with poor financial records in countries with robust markets and economic freedom. Financial flexibility and restrictions leading to zero debt are linked to firm and institutional characteristics in emerging countries.

1. Introduction

This study aims to assess both the demand- and supply-sides of debt, specifically the financial flexibility and financial constraints hypotheses, as they relate to companies' propensity to be unleveraged. This extreme capital structure decision is influenced by multiple internal factors within the company as well as contextual elements that shape the use of debt by companies. Extensive research documented that institutional arrangements, quality of regulation and law enforcement, and market efficiency and freedom play crucial roles in shaping companies' debt decisions, including the adoption of a zero-debt policy (Bessler et al., 2013; El Ghoul et al., 2018; Kirch and Soares, 2012; Zhang, 2016). For instance, Cline et al. (2021) argue that the country's individualistic values and regulation vis-à-vis its enforcement leads to healthier financial markets. Consequently, the impact of a country's institutional framework on markets, particularly in the developing stages, is expected to influence capital structure decisions, and subsequently, zero-debt policy. Therefore, our research seeks to shed light on why all-equity firms are prevalent in Brazil, Russia, India, China, and South Africa (BRICS countries) despite the lack of a clear theoretical consensus on the advantages of avoiding debt financing. While empirical evidence highlights the significance of unleveraged companies, particularly in developed economies (Morais et al., 2020),

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our data reveal no substantial differences in market value between leveraged and unleveraged companies in the BRICS countries. This finding contrasts with the results of Korteweg (2010) for his US sample, which indicate that leveraged firms are worth, on average, 5.5% more than unleveraged firms. However, using a worldwide sample, Saona et al. (2020) observe that unleveraged firms have higher profit margins and market-to-book values than leveraged companies. This raises several theoretical and empirical questions regarding zero-debt companies. First, we assess the likelihood that firms in these markets maintain zero or near-zero debt. Second, we examine the determinants of zero-debt decisions from the demand- and supply-sides considered in existing empirical literature. Third, we address how differences in institutional conditions affect a company's likelihood of using debt. Our analysis considers not only cultural differences, which are time-invariant, but also dimensions such as the rule of law, regulations, accountability, government effectiveness, political stability, and corruption levels, which evolve annually for each country. Finally, we explore the bivariate decisions driven by the financial flexibility and financial constraints hypotheses, which explain the probability of a firm becoming a zero-debt company. These questions are crucial: we have various partial approaches contributing to an incomplete picture of the capital structure followed by companies, but lack a general theory of capital structure that explains the zero-debt policy (Saona et al., 2023a). The BRICS countries, characterized by high-growth economies in unstable and underdeveloped markets with pervasive government intervention, offer an opportunity to test whether the presence of zero-debt companies is related more to institutional variables than to the costs and benefits of debt.

Thus far, evidence is insufficient for an in-depth understanding of how companies make the no-debt decision in emerging countries (Saona et al., 2023a; Dang, 2013; Huang et al., 2017). There are three key reasons for focusing on all-equity firms in emerging economies: a) limited access to financial markets and multiple market frictions in the BRICS and emerging markets; b) companies in these countries experience rapid growth, necessitating financing for expansion; and c) the lack of studies addressing the zero-debt puzzle in these regions (Machokoto et al., 2021).

The relevance of BRICS countries is increasing; their share of world GDP grew from 18% in 2010 to more than 26% in 2021, representing a 44% increase in just 12 years. Despite this growth, the average annual performance of the BRICS stock markets from 2010 to 2021 is 3.34%, significantly lower than the average annual performance of the MSCI World Index for developed countries of 11.41%.[1] This disparity highlights a group of companies in rapidly growing environments whose shares underperformed those in developed economies. Given that low-leverage companies accounted more than 20% of listed firms in emerging countries over the last decade, it is pertinent to understand why unleveraged firms are prevalent in emerging countries, particularly in BRICS, and what demand- and supply-side theories of debt explain such extreme debt decisions. Consequently, understanding the demand- and supply-side factors of debt that explain zero debt among BRICS companies is a relevant research question.

Recent empirical evidence from developed markets underscores the worldwide prevalence of zero-debt corporations (El Ghoul et al., 2018; Saona et al., 2020). For instance, Strebulaev and Yang (2013) and Byoun and Xu (2013) find that nearly 20% of US firms are debt-free, while Morais et al. (2021) find that about 11% of European companies are also free of debt. Worldwide, Saona et al. (2020) reveal also that approximately 20% of firms make conservative borrowing decisions to have zero or near-zero debt, with a higher proportion of low-leveraged firms in developed countries in comparison to emerging countries. However, as recently shown by Saona et al. (2023a), there is a notable gap in understanding the phenomenon in developing markets, particularly in BRICS countries.

From the demand side, which the financial flexibility hypothesis represents, the literature presents various rationales for companies to eschew debt. Firms anticipating positive prospects may avoid debt financing to alleviate conflicts of interest between creditors and shareholders, as stated in the underinvestment hypothesis (Mayer, 1997). Baker and Wurgler (2002) argue that managers demand equity instead of debt when the cost of equity is relatively low compared to the cost of debt, a phenomenon called market timing. Similarly, firms concerned about the detrimental impact of debt on the strategic value of future investments may prioritize preserving their borrowing capacity to avoid debt overhang (Denis and McKeon, 2012). Additionally, companies aiming to sidestep debtholder control or entrenched managers seek to evade debtholder supervision may pursue a low-debt policy (Devos et al., 2012). Managerial risk aversion coupled with capable management may also influence preferences for low leverage (Eckel et al., 2007; Meissner, 2016). Addressing agency problems by aligning the interests of managers and internal shareholders is another reason to adopt a low-leverage policy (Yafeh and Yosha, 2003; Jensen and Meckling, 1976). Finally, historical decisions may contribute to the absence of leverage in companies, as managers strive to balance conflicting goals, such as maximizing fundamental value and the share price, and exploiting share mispricing for shareholder benefit (Baker and Stein, 2004).

On the supply-side of borrowing, which pertains to the financial constraints hypothesis, the capital structure of companies is intricately tied to creditors' willingness to provide debt financing. If a firm has poor credit quality, lacks a credit score, or exhibits low profitability, public or private creditors may compel it to adopt a low-leverage capital structure. This implies resorting to equity capital with associated informational dilution costs (Denis and Mihov, 2003a, 2003b). Industries characterized by high market risk, such as those struggling with technological uncertainties or innovations, often face high debt costs, exacerbated by the minimal fixed assets available as collateral. Additionally, the influence of majority shareholders can prove harmful to creditors if the controlling shareholders steer managers toward asset substitution problems by undertaking riskier projects. The challenges of underinvestment and asset substitution are particularly explicit for firms with substantial growth options, where managers have greater managerial discretion and amplify the associated bankruptcy costs (Billett et al., 2007; Harris and Raviv, 1990; Shleifer and Vishny, 1992).

Furthermore, firms operating in developed countries enjoy greater financial flexibility than those operating in developing countries because of access to more efficient stock and debt markets (Saona et al., 2017). Access to external financing is contingent on the

[1] The MSCI World Index offers large and mid-cap representation across 23 Developed Markets (DM) countries (https://www.msci.com/our-solutions/indexes/developed-markets).

development of each country's financial system (Beck and Levine, 2002; Demirgüç-Kunt and Maksimovic, 2002). Regulatory frameworks play a pivotal role in influencing wealth transfer between creditors and shareholders (Levine et al., 2017). Debt, which suffers less from endogeneity problems, is expected to change due to governance changes (Klock et al., 2005). Thus, the introduction of regulations could lead to more debt by improving governance and mitigating moral hazards. Finally, financial crises and weak economic performance contribute to credit rationing and determine the supply-side of corporate borrowing as well (Korajczyk and Levy, 2003; Bena and Li, 2014). Emerging economies exhibit distinctive features that can influence companies' financing decisions, potentially steering them to adopt a zero-debt choice (Kokoreva and Ivanova, 2016). These features include an unstable institutional environment and regulatory system (Lucey and Zhang, 2011; Miller, 1977), structural changes within capital markets and the deregulation of banking systems (Cheung et al., 2011), political instability (Lucey and Zhang, 2011), government-intervened currency markets and interest rates, and aggressive monetary policies (Liu et al., 2016). The interplay between these features motivates our study of the zero-debt puzzle in emerging markets.

We follow an advanced empirical procedure, the bivariate probit model, which is suitable for dealing with the problem of partial observability that arises from the joint decisions of the debtor and creditor. On the demand-side, firms use debt for investment purposes or to address shortages of cash to support operations. On the supply-side, firms issue debts for creditor-related reasons. Because we can observe the outcomes of the creditors' and firms' decisions, but not their decisions, a partial-observability problem arises. Consequently, the univariate probit model falls short, whereas the bivariate probit model captures both decisions and assesses all possible joint probabilities involved in debt decisions.

The analysis reveals the nuanced dynamics on both the demand- and supply-sides that influence firms' zero-leverage decisions. On the demand-side, small young firms with significant growth opportunities are more likely to adopt a low-leverage strategy. Additionally, the factors contributing to a reduction in debt include low asset tangibility, high riskiness, and concentrated ownership structures. Similarly, managers who exhibit debt aversion play a role in diminishing debt usage by strategically timing equity issuances and planning investments to avoid debt financing. On the supply-side, firms are more likely to be unleveraged if they are smaller, have fewer tangible assets, or are opaque and risky. Supply-side factors also indicate that companies in BRICS countries with higher financial development but less economic freedom are prone to being unleveraged.

Our analysis goes beyond the dichotomy between the demand- and supply-sides of debt and allows us to distinguish between low leverage due to a financial flexibility strategy, when the company voluntarily avoids indebtedness, or due to financial constraints, when creditors refuse to lend to the company. Thus, we observe that the probability of a company being low-leveraged due to a financial flexibility strategy increases for young, unmature firms with growth opportunities, high profitability, increased payout ratios, ownership concentration, and strong financial health, particularly in countries with greater economic freedom. Conversely, companies with tangible assets and enhanced financial transparency are less likely to pursue financial flexibility. Additionally, the probability of being a low-leverage company owing to financial restrictions is higher for small firms with decreased profitability, low payout ratios, and dispersed ownership. In addition, companies in countries with better institutional quality have a higher probability of facing financial restrictions, whereas greater economic freedom reduces this probability. This comprehensive examination provides valuable insights into the multifaceted factors influencing corporate zero-leverage decisions, particularly in the unique context of emerging markets.

This study contributes to existing literature in several ways. First, it analyzes the relatively unexplored zero-leverage policy to add depth to our understanding of capital structure decisions. Second, as mentioned above, this study extends this exploration to the realm of companies operating in emerging markets, specifically BRICS countries, which are neglected in the empirical literature despite their rapid economic growth and increasing influence on the regional and global stages. Third, by incorporating institutional variables alongside firm-level variables in our empirical model, we apply a novel bivariate probit technique that goes beyond the widely used standard probit or logit models. This empirical analysis allows us to disentangle demand- and supply-side factors in zero-debt decisions. Fourth, this is the first study to empirically test the financial flexibility and financial constraints hypotheses at the firm level. Finally, our research has practical implications for managers. According to our conclusions, managers should take advantage of their company's reputation, low risk, and tangible assets when negotiating debt contracts.

Section 2 summarizes the literature and introduces our hypotheses. Section 3 describes the methodology, variables, and data used in the empirical analysis. Section 4 presents the results. Finally, Section 5 discusses the study's contributions and presents our main conclusions.

2. Theoretical framework

2.1. Financial flexibility or financial constraints?

In addition to internal firm-level variables that explain corporate leverage, Fan et al. (2012) suggest that the country in which a company operates is also an important determinant of corporate borrowing. In the last decade, the BRICS countries, with the partial exception of South Africa, have evolved into more nationalist and authoritarian governance (Reddy, 2022), potentially leading companies to alter their capital structures to minimize debt reliance and adopt higher equity proportions.

Sakai de Macedo et al. (2015) find that financial flexibility is one of the main factors explaining Brazilian companies' capital structures. Metel'skaya (2021) points out that traditional theories fail to explain Russian firms' capital structure formation. Deb and Banerjee (2018) stress that Indian companies adopt an almost zero-leverage policy to maintain financial flexibility and benefit from superior equity market performance. Huang et al. (2017) argued that government regulations, financial constraints, and financial flexibility contribute to zero-leverage policies in China. Finally, Khémiri and Noubbigh (2018) recognize that South African

companies' leverage decisions are constrained by the macroeconomic environment and government regulations.

To the best of our knowledge, no study comprehensively addresses both the demand- and supply-sides of corporate borrowing to highlight the relevance of the institutional context for zero-debt decisions. Nor do any studies formally analyze the related financial flexibility and financial constraints hypotheses. The present study addresses both these gaps.

As Saona et al. (2023a) state, existing theoretical frameworks on capital structure decisions (e.g., dynamic or static trade-off theory, pecking order theory, market timing theory, and the financial-growth-cycle paradigm) consider debt a *conditio* sine qua non in the corporate capital structure. Nevertheless, many companies borrow less than these theories predict or even hold all-equity capital structures. Indeed, Graham (2000) states that, "paradoxically, large, liquid, profitable firms with low expected distress costs use debt conservatively," and suggests that this conduct appears to be persistent. Thus, Saona et al. (2020) document that nearly 20% of listed companies worldwide use debt conservatively, but such behavior is not homogeneous among the countries and/or the years in the sample. These authors find that the percentage of listed companies with conservative debt use is more relevant in developed countries than in emerging countries.

The question is not only why some firms have low leverage, but also why such firms decide to remain unleveraged for a long period. Iliasov and Kokoreva (2018) argue that the main driver of zero-debt policies in emerging countries is the pursuit of financial flexibility as a self-imposed decision in which a company's operations are financed with equity and internal funding. Financial flexibility refers to a company's liquidity, which is sufficient to respond to unexpected needs (Marchica and Mura, 2010). Despite being eligible for debt financing, some firms opt not to borrow as a demand-side decision (Huang et al., 2017; Strebulaev and Yang, 2013). The second argument, explaining all-equity firms, concerns financial constraints primarily on the supply-side, such as impositions by creditors (Morais et al., 2020). This perspective emphasizes the external factors that influence a firm's zero-debt decisions, extends the analysis beyond internal preferences, and sheds light on the interplay between companies and external financial stakeholders. Hence, debt financing is a strategic decision that goes beyond weighing the advantages and drawbacks of leverage (Lotfaliei, 2018). Appendix A summarizes the contributions of the most important literature pertinent to this study.

2.2. Hypotheses

We consider the possibility that the demand- and supply-sides of the debt market affect a zero-debt policy. On the demand-side, we assess firms' internal decisions by examining the financial flexibility hypothesis. Additionally, on the supply-side, we assess the exogenous impact of the institutional environment, driven by the financial constraints hypothesis.

In accordance with Dang (2013), the financial flexibility hypothesis holds that in the presence of market frictions such as adverse selection (Myers and Majluf, 1984) or transaction costs (Leary and Roberts, 2005), firms eschew debt and accumulate cash to save their borrowing capacity for future investment opportunities (Bessler et al., 2013; Gamba and Triantis, 2008).

The financial constraints hypothesis is a pivotal theoretical argument explaining the persistence of low or zero debt (Korajczyk and Levy, 2003). According to Stiglitz and Weiss (1981), credit rationing occurs because of information asymmetry. Indeed, Faulkender and Petersen (2006) find that market frictions that make capital structure relevant may be associated with a firm's source of capital and that capital availability does not depend solely on the firm's characteristics. Metel'skaya (2021) adds that macroeconomic factors and market development play prominent roles in explaining debt financing. Huang et al. (2017) argue that Chinese firms without external financing needs exhibit zero-leveraged capital structures.

We formulate our research hypotheses concerning the determinants of zero debt based on the existing literature. The comprehensive framework incorporates 11 company-based characteristics (e.g., size, growth opportunities, asset tangibility, market timing, firm liquidity, profitability, financial reporting quality, ownership structure, life cycle, financial risk, and managerial behavior) and three contextual factors (e.g., institutional quality, economic freedom, and degree of financial development). We distinguish between situations in which the zero-leverage policy emerges from self-imposed decisions (demand-side) supported by the financial flexibility hypothesis and instances in which debt market conditions (supply-side) drive the debt policy according to the financial constraints hypothesis. Appendix B summarizes the relevant literature for each research hypothesis.

Our first hypothesis was based on company size. Large companies, including those in BRICS countries, typically exhibit fewer asymmetric information issues and lower transaction costs. Consequently, they are more likely to seek debt financing and exhibit less concern about financial flexibility than small companies. As Diamond (1991) states, in the context of adverse selection and moral hazard, companies with weaker reputations, a common feature among BRICS companies, suffer more from financial constraints because they face higher barriers to the credit market. Furthermore, since executives in small and medium-sized BRICS-based companies aim to build their reputations globally, they typically opt for equity financing, foregoing the theoretical advantages of debt financing (McConnell and Servaes, 1995).

Our second hypothesis is that growth opportunities influence zero-debt decisions. The deliberate pursuit of financial flexibility associated with the underinvestment hypothesis is particularly plausible in BRICS-based companies that prioritize funding value-creating projects as equity capital. This is emphasized by Yasmin and Rashid (2019), who argue that financial flexibility is crucial in developing economies characterized by substantial business risk and unstable financial markets. Therefore, we expect that firms in BRICS countries will eschew debt and accumulate cash as a proactive measure before market frictions such as adverse selection, transaction costs, or information asymmetries negatively affect their investments. Moreover, companies in BRICS countries with valuable growth opportunities are likely to face greater financial restrictions as creditors are less willing to lend to companies whose value depends primarily on non-collateralizable growth opportunities.

Our third hypothesis concerns asset tangibility and their role in shaping a firm's zero-debt decisions. We hypothesize that BRICS firms with high tangible assets are more likely to be leveraged. Informational asymmetries and agency costs are likely to be high for

BRICS-based firms with relatively high proportions of non-collateralizable assets (Benmelech and Bergman, 2009; Bigelli et al., 2014). Thus, tangibility is associated with lenders' higher debt offers, which reduces the likelihood of remaining unleveraged.

The fourth hypothesis concerns liquidity. We hypothesize that companies in the BRICs countries face higher market frictions; thus, they favor cash and avoid debt financing to prepare for future investments (Gamba and Triantis, 2008).

The fifth hypothesis considers the effect of firms' profitability on their decisions regarding the zero-debt policy. In the context of BRICS countries, characterized by growing economies and unstable financial markets, the financial flexibility and financial-restriction hypotheses become more relevant. We hypothesize that, in BRICS countries, more profitable companies are more inclined to adopt a zero-leverage policy. For instance, Deb and Banerjee (2015) find that Indian zero-debt firms exhibit substantial capital structure flexibility. These firms maintain higher cash reserves to mitigate financial restrictions, capitalize on more growth opportunities, and are viewed positively by market participants, resulting in higher risk-adjusted stock returns.

Our sixth hypothesis explores the role of financial reporting quality from the supply-side of debt. We expect that as financial reporting improves in BRICS countries, continuously traded securities experience reduced information asymmetry, making stock prices more informative than bond prices (Chang and Yu, 2010). This favors the supply of equity financing over debt financing (Saona and Vallelado, 2012).

Our seventh hypothesis is focused on a firm's ownership structure. In instances of concentrated ownership structures, as could be the case for BRICS companies, managers are incentivized to reduce debt to maximize firm value because they mitigate underinvestment and asset substitution problems (Denis and Mihov, 2003a, 2003b). BRICS-based companies with highly concentrated ownership structures may remain suboptimally leveraged to avoid adverse selection and moral hazard problems. In the corner solution, they operate with no debt, because their information asymmetries and agency conflicts between owners and lenders are greater.

A company's lifecycle is the subject of the eighth hypothesis. Companies in their early stages of life often lack the reputation necessary to access borrowing options. Corporate reputation matters more to debt demand in BRICS countries than in developed countries. Compared with developed economies, the smaller size and weaker reputation of BRICS-based companies amplify the importance of reputation in influencing debt demand (Castro et al., 2016; Lefebvre, 2021).

Our ninth hypothesis relates to financial risk. We expect healthy, large, liquid, and profitable firms in BRICS countries with low expected distress costs to conservatively use debt. On the supply-side, we hypothesize that creditors in unstable environments, as could be the case in the BRICS countries, are less willing to lend and reduce their debt supply.

The tenth hypothesis concerns market timing. Companies operating in BRICS countries frequently encounter undervaluation and financial constraints, prompting managers to adopt a strategy of lower equity issues and reduced investments compared to scenarios without mispricing (Baker and Wurgler, 2002).

The eleventh hypothesis deals with the combination of managers' aversion to debt and their biases of optimism and overconfidence in explaining a company's unleveraged capital structure. In the context of BRICS-based companies, managers may be more optimistic about their companies' prospects than managers in developed countries because they operate in high-growth environments. This aligns with the basic optimism model, which predicts a manager's preference for equity over debt (Heaton, 2002).

In a contextual setting, when the economy in which the company operates is growing, as is the case in BRICS countries, optimistic, debt-averse managers would borrow insufficiently despite increasing income streams (Eckel et al., 2007). Additionally, overconfident managers who underestimate earnings risk may perceive a company's debt as undervalued and too expensive as a source of capital (Hackbarth, 2009). Finally, highly leveraged companies must be cautious about their dividend policies as they must meet their debt obligations. Consequently, the probability that a company becomes unleveraged when run by debt-averse, optimistic, or overconfident managers increases with higher dividends and sales. We hypothesize that the transition to unleveraged status increases with dividend payouts. Companies that embrace generous dividend policies have a higher chance of becoming unleveraged and prefer equity over debt.

The twelfth hypothesis concerns a country's institutional quality. The costs and benefits of debt are transitory and not permanent, which could discourage managers from deciding solely on these factors and lead them to consider the country's overall institutional quality (La Rocca et al., 2007). In the law and finance literature, Kirch and Soares (2012) argue that the complexity of debt contracts is highly determined by the quality of the institutional system and the enforcement of regulations. Thus, the degree of investor protection correlates with investors' willingness to fund the corporate sector. For instance, Lin and Tai (2013) argued that the degree of financial development influences access to financial markets and intermediaries. Similarly, Demirguç-Kunt and Maksimovic (1998) argue that the effectiveness of the legal and institutional system is paramount in making long-term borrowing feasible, because firms commit credibility associated with their financial flexibility, on the one hand, and because creditors protect themselves with debt covenants to mitigate moral hazard problems, associated with the financial constraints hypothesis, on the other hand. On the supply-side, however, Machokoto et al. (2021) argue that financial conservatism remains prevalent and persistent in emerging countries, suggesting that capital market friction and credit rationing are important barriers to corporate borrowing. Our study develops a more comprehensive approach by including institutional variables that mitigate the probability of estimating biased coefficients from omitted variables. Hence, our hypothesis implicitly recognizes that BRICS-based companies are subject to political and corporate systems with practices that differ substantially from those in developed markets.

Country-level economic freedom is the subject of our thirteenth hypothesis. Zhang (2016) considers a model of economic integration that suggests that the enforcement of economic rights provides the foundation for different agents to be economically self-governing and have inherent freedom in the financial decision-making process. Without proper enforcement of economic rights, inefficiencies lead to suboptimal decisions in the credit market, such as the subsequent deadweight loss of debt financing. Indeed, in countries with limited financial freedom, such as emerging markets, one would expect debt to be less available to firms and on less favorable terms than in developed economies. China is a good example where government regulations lead to lower leverage among

companies (Xu and Wu, 2022). These interventions influence the market equilibrium of corporate debt, suggesting that the Chinese government plays a disciplinary role in regulating corporate borrowing. This study incorporates country-level economic freedom variables that consider multiple aspects like economic freedom in the rule of law, government size, regulatory efficiency, and open markets in its analysis.

The last hypothesis, centered on the supply-side of debt, considers countries' financial development. Demirguç-Kunt and Maksimovic (1998) build on the idea that developed and active financial systems are characterized by low information costs and the existence of an efficient intermediary sector that channels long-term capital to the corporate sector. In volatile financial contexts, such as emerging markets, particularly in BRICS countries, however, a zero-debt strategy can enhance reputation and avoid debt overhang (Huang et al., 2017). Therefore, companies in these financial systems face greater financial restrictions due to market uncertainty than do companies in developed markets (Yung et al., 2015).

Appendix B provides additional arguments for our hypotheses and a summary, distinguishing between the financial flexibility and financial constraints hypotheses.

3. Methodology

In this study, we examine the determinants of the demand- and supply-sides of debt that explain the probability of a BRICS-based company having zero or near-zero debt. We use bivariate probit models with partial observability to analyze the influence of these determinants. This technique is suitable for dealing with the problem of partial observability that arises because of the joint decisions of the debtor and creditor (Morais et al., 2020). On the demand-side, firms seek debt for investment purposes or as a strategy for handling shortages of cash for operating activities. On the supply-side, firms issue debts for creditor-related reasons. Because there is no way to observe creditors' and firms' decisions, but only the joint outcome of such decisions, the partial-observability problem arises. Consequently, the univariate probit model falls short, whereas the bivariate probit model captures both decisions and assesses all possible joint probabilities involved in debt decisions.

We focus on companies in BRICS countries because of their unique development models, which differ from those of developed and industrialized economies (Armijo, 2007; Samargandi et al., 2020). According to the International Monetary Fund (IMF), the BRICS group will represent about 32.1% of global GDP in 2023.[2] The group also contains about 40% of the world's population, represents about 30% of the world's land mass, and accounts for about 18% of global trade. Furthermore, each BRICS country has a high GDP growth rate and growing share of world trade. According to World Bank data, the annual growth rate of world GDP was 4.1% between 2010 and 2021, whereas BRICS countries experienced an average growth rate of 8.5%, ranging from 1.0% in Brazil to 11.2% in China.

3.1. Data sources

To test our hypotheses, we analyze a sample of 6431 non-financial companies listed on the stock exchanges of Brazil, Russia, India, China, and South Africa between 2010 and 2021, providing 41,401 company-year observations (see Appendix C). As we observe individual firms over a long period, we analyze cross-sectional and time-series data using panel data techniques (Dang et al., 2015). We include a minimum of four continuous observations per company, which, according to Arellano and Bond (1991) and Baltagi (2013), is a requirement for running an efficient panel data estimation and conducting a second-order autocorrelation test. On average, we have 6.44 observations per company. Appendix C provides information on the panel composition.

Financial and accounting information was obtained from Thomson Reuters's Refinitiv Eikon database. Given their regulated status and differing financial reporting systems, financial institutions were excluded from the sample. Information about institutional characteristics was obtained from various sources such as the Worldwide Governance Indicators (Kaufmann et al., 2011) and the Financial Structure Database (Beck et al., 2000), both published by the World Bank. The countries' Economic Freedom Index scores were obtained from the Heritage Foundation.[3]

3.2. Empirical model

The empirical literature on zero-debt policy focused on explaining the drivers of zero leverage but fails to disentangle the demand- and supply-sides of the decision and discern whether an unleveraged position is a deliberate financial flexibility strategy or a result of financial restrictions. As Morais et al. (2020) suggest, this decision involves two primary decision makers: the firm, which decides whether to borrow external funds, and the creditor, which decides whether it is willing to grant funds to finance the firm's operations. The underlying assumption of the standard probit model is that all firms requesting external funds secure them. By contrast, the bivariate probit model can account for the entire debt decision-making process by considering why companies seek to obtain external funds *and* why suppliers of funds choose to grant them. The inherent partial observability in the debt decision process implies that the

[2] The article, "The Rise of the BRICS" provides information on the global economy and the geopolitical landscape over the last couple of decades and compares the BRICS countries with the G7 group. The statistics can be found at https://www.statista.com/chart/30638/brics-and-g7-share-of-global-gdp/.

[3] The Heritage Foundation aims to promote public policies that enhance free economy and enterprise, individual freedom, and limited government intervention. Details on the construction of the Index of Economic Freedom as well as the dataset can be obtained from https://www.heritage.org/index/.

standard probit model is insufficient for disentangling the two components and looks only at the joint outcome (Meng and Schmidt, 1985).

Likewise, Morais et al. (2020) estimate a bivariate probit model with partial observability in the sense of Poirier (1980), which allows us to estimate the factors that underlie a firm's decision to seek debt (demand-side) and the factors that drive the creditor's lending decision (supply-side). To do so, we describe these decisions as $y_1 = 1$ when the company resorts to debt and 0 otherwise, and $y_2 = 1$ if the creditor grants credit to the company and 0 otherwise. Each dummy variable is determined by one latent variable, y_1^* or y_2^*, which takes the value of 1 when they are positive. Hence, the latent variables are governed by the following equation:

$$y_1^* = \beta_1' x_1 + \varepsilon_1 \tag{1}$$

$$y_2^* = \beta_2' x_2 + \varepsilon_2.$$

x_1 and x_2 represent vectors of independent variables on the demand- and supply-sides of debt, respectively; β_1' and β_2' correspond to the estimated coefficients; and ε_1 and ε_2 are the error terms, which we assume follow a bivariate normal distribution $\phi_2(\varepsilon_1, \varepsilon_2)$, with $E(\varepsilon_1) = E(\varepsilon_2) = 0$, $Var(\varepsilon_1) = Var(\varepsilon_2) = 1$, and $Cov(\varepsilon_1, \varepsilon_2) = \rho$.

Our bivariate model considers four possible debt-behavior decisions: (1) The firm wants debt, and the creditor wants to grant credit $[Pr(y_1 = 1, y_2 = 1)]$. (2) The firm wants debt, but the creditor does not want to extend credit, $[Pr(y_1 = 1, y_2 = 0)]$. (3) The firm does not want debt, but the creditor would extend credit $[Pr(y_1 = 0, y_2 = 1)]$. (4) The firm does not want debt, and the creditor would not grant credit $[Pr(y_1 = 0, y_2 = 0)]$.

The probability that the ith firm decides to pursue debt and that credit is granted by the creditor is

$$Pr[y = 1] = Pr[y_1^* > 0, y_2^* > 0] = Pr[\varepsilon_1 > -\beta_1' x_1, \varepsilon_2 > -\beta_2' x_2] = \phi_2(\beta_1' x_1, \beta_2' x_2, \rho). \tag{2}$$

Reciprocally, the probability that the ith firm holds no debt is

$$Prob[y = 0] = 1 - Prob[y_1 = 1]. \tag{3}$$

In contrast to conventional zero-leverage empirical studies, our approach involves a direct modeling of the probability of a firm being leveraged rather than debt-free. To better understand this distinction, Morais et al. (2020) recommend considering a scenario in which variables y_1 and y_2 are coded inversely (e.g., taking a value of 1 if no debt was required or granted). In this coding framework, a zero-leverage company is observed if $(y_1 = 1, y_2 = 0)$, $(y_1 = 0, y_2 = 1)$, or $(y_1 = 1, y_2 = 1)$. However, using Eq. (2) with a bivariate probit model featuring partial observability, we can directly estimate only the probability of observing zero-leverage firms of the last type: $[Pr(y_1 = 1, y_2 = 1)]$. With this setting, it is not possible to distinguish the other two types of zero-leverage firms from leveraged firms $(y_1 = 0, y_2 = 0)$. Heywood and Mohanty (1994) apply similar specifications in the labor market and Grilli (2005) in the bank loan market.

As Poirier (1980) notes, despite not observing y_1 and y_2, estimating the coefficients of the demand and supply functions remains feasible. The likelihood function of the model is

$$L = \prod_{y=1} [\phi_2(\beta_1' x_1, \beta_2' x_2, \rho)] \prod_{y=0} [1 - \phi_2(\beta_1' x_1, \beta_2' x_2, \rho)]. \tag{4}$$

The two equations are jointly estimated using maximum likelihood. For the model to be identified, at least one of the variables contained in x_1 must not appear in x_2, or vice versa $(x_1 \neq x_2)$.

We estimate two (seemingly unrelated) nonlinear processes. To control for the interrelations between their unobservables, following Plum (2016), the estimator uses quasi-random numbers (Halton draws) and maximum simulated likelihood to estimate the correlation between the error terms of both processes. Because the partial-specificity model commonly has poor convergence properties, we use a suitable Poirier (1980) option in the estimations.

To compare the suggested bivariate probit model and develop an even stronger method, we compare the findings to those obtained through standard univariate probabilistic fixed-effect regression analysis, which is typical in prior studies (Bae and Chung, 2022; Huang et al., 2017).

3.3. Variables and models

Our dependent variable (*NZL*) is a dummy that takes the value of 1 if the company has debt and 0 if the company is fully unleveraged. This measure is consistent with those in the literature (Dang, 2013; Morais et al., 2020, 2021; Saona et al., 2020; Strebulaev and Yang, 2013). The variables we consider relevant for the demand-side are the company's size, growth opportunities, asset tangibility, liquidity, profitability, ownership structure, life cycle, financial risk, market timing feature, managers' behavior, and the quality of the country's institutional system. For the supply-side, the relevant variables are the company's size, growth opportunities, asset tangibility, profitability, financial reporting quality, ownership structure, financial risk, and the country's institutional quality, economic freedom, and financial development. Appendix D provides definitions of each variable.

We propose two variables to measure company size: *Size* and *Sizeage*.[4] *Size* is measured as the natural logarithm of the firm's total assets (Kokoreva and Ivanova, 2016). As in Hadlock and Pierce (2010), $Sizeage = (-0.737 \times Size) + (0.043 \times Size^2) - (0.040 \times Age)$, where *Age* is the number of years since the incorporation of the company. Growth opportunity, (*GO*) are measured with a Tobin's Q proxy, which is the sum of market capitalization and corporate debt divided by total assets (Chung and Pruitt, 1994). Asset tangibility (*Tang*) is the proportion of net property, plant, and equipment as a share of total assets (Saona et al., 2020). Liquidity (*Liquid*) is measured as current assets over current liabilities, and profitability (*ROA*) is net income as a share of total assets.

We follow Saona et al. (2023b) and compute four measures of financial reporting quality—*Transp*1, *Transp*2, *Transp*3, and *Transp*4—based on Thomson Reuters data and StarMine's earnings quality algorithm, where earnings quality is an indicator of financial transparency. StarMine defines earnings quality as the reliability and persistence of past earnings. High-quality earnings accurately reflect a company's current and past operating performance, indicate future operating performance, and represent a reliable valuation measure for the company at all earnings levels (Carver et al., 2013; Cline et al., 2021). StarMine states that poor earnings quality indicates the likelihood of deteriorating fundamentals, low financial transparency, and low financial reporting quality. This metric of earnings quality ranges from 0 to 1, with values increasing as earnings quality and informativeness improve. StarMine's earnings quality formula includes accruals, cash flows, and operating efficiency. Our primary measure of earnings quality and transparency is *Transp*1, which includes all three components. For robustness, we build three alternative metrics that correspond to each component: accruals (*Transp*2), cash flow (*Transp*3), and operating efficiency (*Transp*4). To the best of our knowledge, this is the first study to use these metrics.

We follow Saona and San Martín (2018) in computing two proxies for corporate ownership concentration: *OwnCon*, which measures the majority shareholder's direct voting rights, computed as the proportion of outstanding shares in their portfolio (Ramalho et al., 2018); and *OwnClosely*, used for robustness purposes, defined as the fraction of outstanding shares held as cross-holdings[5] (e.g., shares held by corporations and holding companies), governments, employees, and insiders (e.g., managers, executive officers, and directors).

Following Anthony and Ramesh (1992) and Saona et al. (2020), the company life cycle (*LifeCycle*) was measured as $LifeCycle = (1 + Div) \times (1 + SalesGrowth) \times (1 + CAPEX)$, where *Div* is the dividend ratio (the annual dividend payment as a share of earnings before extraordinary items), *SalesGrowth* is annual sales growth, and *CAPEX* is capital expenditure over the sum of market capitalization and long-term debt. *LifeCycle* is a continuous variable with lower values for mature and stagnant companies and greater values for growing and startup companies.

Our measure of financial risk is the emerging-markets version of the Altman (2005) *Z*-Score (*ZScore*). The variable is computed as $ZScore = 6.56 \times WK + 3.26 \times RE + 6.72 \times OI + 1.05BE + 3.25$, where *WK* is working capital over total assets, *RE* is retained earnings over total assets, *OI* is operating income over total assets, and *BE* is the book value of equity as a share of total liabilities.

Two variables are used to measure market timing features: the capital market value (*CMKV*) and non-debt tax shields (*NDTS*). Capital market value is measured as the market value in t period over market value in $t-1$ (Baker and Wurgler, 2002), whereas *NDTS* is computed as annual depreciation over the firm's total assets (Graham, 2000; Saona et al., 2020).

Our alternative measures of manager behavior are the dividend payout ratios (*Div*), retained earnings growth (*REG*), and sales growth (*SG*). *Div* is the annual dividend payment as a share of earnings before extraordinary items, *REG* is the ratio of retained earnings in period t to the share of retained earnings in $t-1$, and *SG* is the result of comparing total revenue in t divided by total revenue in $t-1$.

The World Governance Indicators (*WGI*) are used to measure a country's institutional quality. *WGI* is publicly available from the World Bank and is based on the work of Kaufmann et al. (2011). It is a covariable that ranges from approximately −2.5 (weak) to 2.5 (strong), and includes measures of rule of law, regulatory quality, voice and accountability, government effectiveness, political stability, and control of corruption.

We measure economic freedom with the Economic Freedom Index (*EconFree*), which corresponds to the degree of the country's economic freedom, prosperity and opportunity published by the Heritage Foundation. This indicator incorporates several dimensions, including financial, business, trade, and investment freedom, which are weighted equally to generate an indicator of economic freedom on a scale of 0 to 1. Finally, for financial development, we use the stock market's total value-traded (*SMTVT*), which corresponds to the total value of all traded shares on a country's stock exchange as a percentage of GDP. This variable is obtained from the Financial Development and Structure Dataset published by the World Bank and developed by Beck et al. (2000).[6] The incorporation of these institutional variables has the advantage of mitigating biased and inconsistent estimations of parameters as a consequence of the omission of country-level variables. These variables take into consideration country-year changes that add heterogeneity to the distribution of these covariates and possible unobservable features, such as different taxation or accounting systems across countries, that might impact the zero-leverage policy. In addition, the models include country, industry, and time dummy variables.

[4] We use *SizeAge* as a robustness check and find qualitatively similar results to those using *Size*. For brevity, we do not tabulate these findings, but they are available upon request.

[5] Shares are closely held, rather than widely held, when a company's common shares are predominantly owned by one individual or by a small group of controlling stockholders.

[6] The Financial Development and Structure Dataset is available thanks to information provided by the World Bank until 2019 (https://www.worldbank.org/en/publication/gfdr/data/financial-structure-database). Hence, information on the last two years needed to calculate *SMTVT* is based on the method of imputation through exponential smoothing.

4. Results

4.1. Descriptive statistics

Appendix C provides the structure of our sample, which includes 41,401 observations, 6431 companies for the period 2010–2021, and their distribution among the five BRICS countries. Fig. 1 compares the temporal evolution of the proportion of unleveraged and low-leverage companies throughout the analysis period. Notably, in the aftermath of the financial crisis of 2007–8, the proportions of debt-free companies and companies with low debt increased until 2016. Subsequently, the proportion of low-leverage companies in the BRICS countries reached its maximum in 2016–17, after which it reverted to its mean values. This pattern aligns with that of Saona et al. (2020), who highlight the stability of low-leverage companies in emerging markets. Fig. 1 shows similar information by country. Figs. 2 and 3 show that the market values of leveraged and unleveraged BRICS-based countries are similar and constant throughout the years in our sample.

Table 1 provides information about the mean, standard deviation, and minimum and maximum values of the various covariates used in the empirical analysis for the total sample, while Appendix E provides this information broken down by country (Panels A through E). The sample of firms in Table 1 indicates that about 8.2% of the firms adhere to the zero-leverage policy and almost 23% maintain a leverage ratio below 5% of total assets. Brazil (Panel A, Appendix E) has the lowest proportion of companies that incorporate zero debt into their capital structures. By contrast, China (Panel B, Appendix E) has the highest proportion of debt-free companies and those with low debt ratios. In developed markets, Strebulaev and Yang (2013) find that the proportion of debt-free firms in the US rose from 4.3% in 1980 to 19.5% in 2009. Globally, Saona et al. (2020) assert that approximately 20% of companies make conservative borrowing decisions, positioning them as all- or nearly all-equity firms, with developed countries showing a higher proportion of low-leverage firms than emerging markets. Furthermore, Lefebvre (2021) shows that 25% of French publicly listed firms exhibit debt levels that are lower than predicted by prevailing capital structure theories.

Table 1 presents the variables used in the empirical analysis of the entire sample. Fixed assets (*Tang*) represent 30.11% of total assets, while the liquidity profile (*Liquid*) indicates that the most liquid assets are about 2.40 times greater than current liabilities on average. The net income of the companies is 4.72% of total assets (*ROA*). Companies in emerging economies are characterized by a highly concentrated ownership structure that serves as an internalized corporate governance mechanism, particularly when financial and institutional environments may not adequately safeguard minority shareholder rights. The descriptive statistics show that almost one-third of the outstanding shares are in the portfolio of the majority shareholder (*OwnCon*), a proportion surpassing that observed in developed markets (Gugler et al., 2008; Setia-Atmaja, 2009). Regarding companies' financial risk (*ZScore*), the average coefficient in the sample is 8.10, which is above the threshold of 2.60 deemed as safe, and has a very low probability of bankruptcy based on the given financial figures only (Altman, 2005). Notably, the quality of the financial statements (*Transp*1 through *Transp*4) aligns with the averages from previous studies (Orazalin, 2020).

The measures of market timing that correspond to the growth of market capitalization (*CMKV*) and the non-debt tax shields (*NDTS*) indicate that the market firm value in an average company in the region has experienced a dramatic increase with an average rate far above the unit, while the non-debt tax shields represented by annual depreciation corresponds to 1.67% of total assets. Finally, the descriptive statistics reveal that the payout ratio is 22.12% of the earnings and the average growth rate of sales of 11.08% remains far above typical rates in developed and industrialized economies.

Table 2 Panel A compares firms with no debt (*ZL*) and those with debt (*NZL*), and those with more that 5% of debt (*NZL*5) and those with less than 5% of debt (*ZL*5). We use the mean-difference *t*-test to compare the two couples of groups of firms. The unleveraged companies (*ZL*) in our sample are smaller, more profitable, more solvent, and have a lower proportion of tangible assets, more growth opportunities, pay greater dividends, and are more liquid than leveraged firms (*NZL*). The variable that measures companies' life cycles shows that leveraged companies are more mature and stagnant than unleveraged firms, which tend to be younger and exhibit faster growth (Anthony and Ramesh, 1992). Finally, the results support the hypothesis that the zero-debt companies in our sample are more financially transparent and show a higher ownership concentration than their leveraged counterparts. The findings are comparable for companies with more than 5% of debt (*NZL*5) and those with less than 5% of debt (*ZL*5) in their capital structures. In Table 2 Panel B we compare leveraged and unleveraged companies for each industry. We observe a higher proportion of unleveraged firms in the healthcare and technology industries, while companies with debt on their balance sheets are more prominent in basic materials and utilities industries. For instance, healthcare companies with low debt are about 10.84% of all low-debt observations, while they represent only 7.27% of leveraged firm year observations. Technology companies with low debt are about 16.41% of the unleveraged observations, while they represent only 11.06% of the leveraged sample.

4.2. Multivariate analysis

We follow three steps for the multivariate analysis. First, we interpret the coefficients of the bivariate probit models with robust standard errors and compare these outcomes with those of the standard univariate probit model with random effects. Second, we interpret the marginal effects of the leverage decisions in the case in which firms want debt and creditors want to extend credit $[Pr(y_1 = 1, y_2 = 1)]$. Finally, we interpret the marginal effects corresponding to the financial flexibility hypothesis $[Pr(y_1 = 0, y_2 = 1)]$ and the financial constraints hypothesis $[Pr(y_1 = 1, y_2 = 0)]$. In all models, the dependent variable is *NZL* and the explanatory variables are those described in Appendix D.

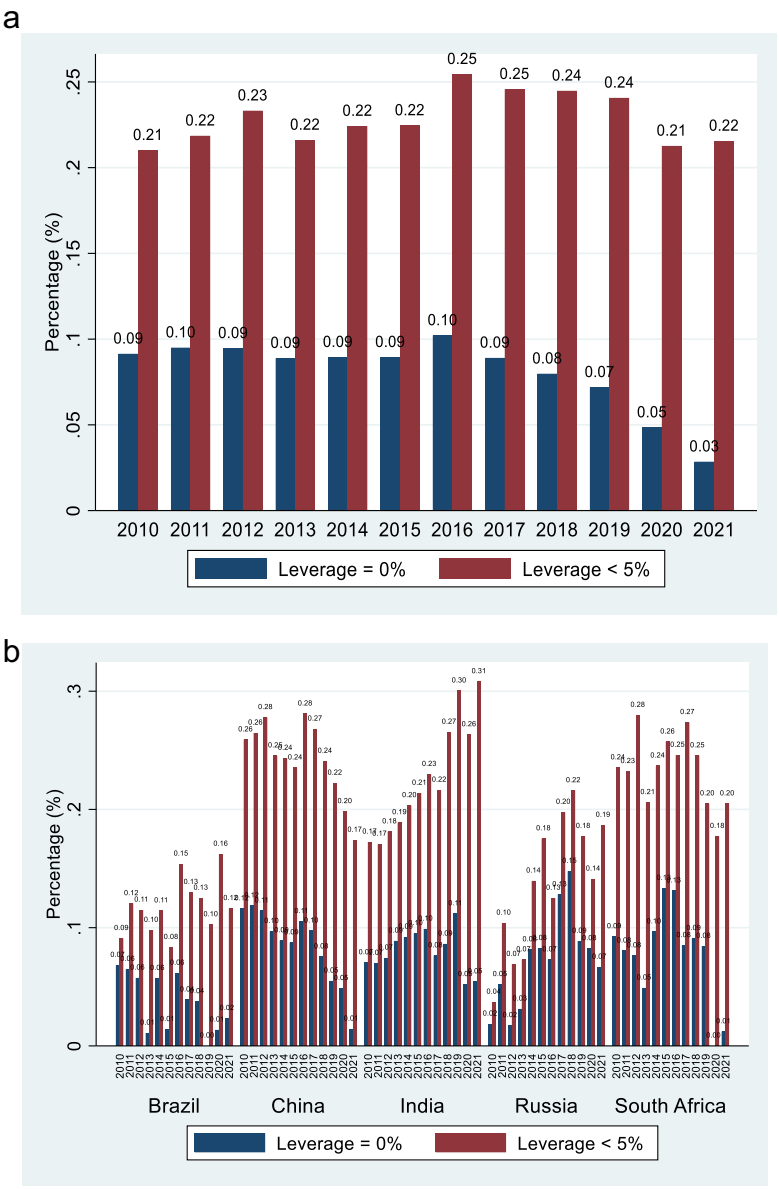

Fig. 1. a. Zero-debt and near zero-debt companies over time. b. Zero-debt and near zero-debt companies over time by country.
This figure shows the proportion of zero-debt companies (ZL) and near zero-debt companies, with less than 5% of liabilities, $(ZL5)$ in the sample over the period of analysis.
This figure shows the proportion of zero-debt companies (ZL) and near zero-debt companies, with less than 5% of liabilities, $(ZL5)$ in the sample over the period of analysis and by country.

4.2.1. Bivariate versus univariate probit models of zero debt

Table 3 provides the results of our hypotheses testing, offering a comparative analysis of the two bivariate probit models and their corresponding standard univariate probit specifications. Because the variables *SMTVT* and *EconFree* generate multicollinearity problems, we run two models and include these variables in the first and second models, respectively. The correlation coefficients of the bivariate models are $\rho = 0.922$ and $\rho = 0.834$, respectively; they measure the correlation between the disturbances (or omitted factors) in the equations. That is, ρ roughly measures the correlation between the outcomes after accounting for the influence of the included covariates. The rejection of the null hypothesis that $\rho = 0$ in both cases lead us to conclude that both equations should be estimated jointly with the bivariate probit model technique, instead of independently running standard univariate probit regressions.

Table 3 indicates that larger companies are more likely to demand credit and be granted credit, as observed by the statistically significant coefficient of *Size*. Consequently, smaller companies are more prone to maintaining zero debt than their larger counterparts. Regarding the supply-side, the results indicate that creditors are more willing to grant loans to larger firms, thereby increasing their

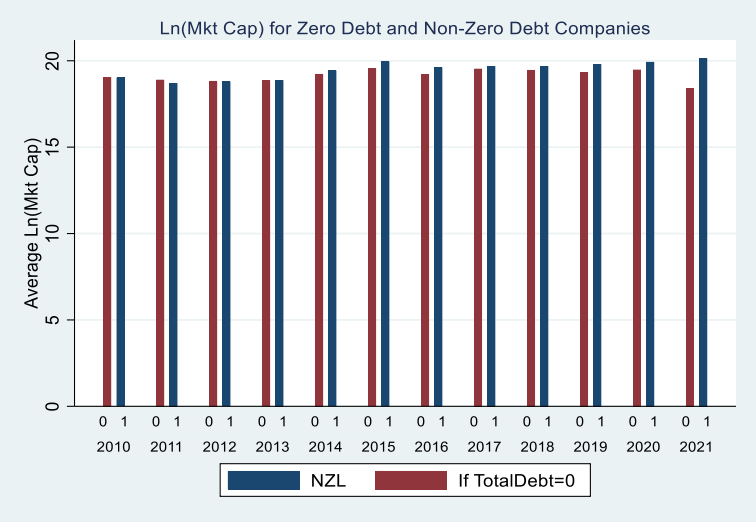

Fig. 2. Zero-debt and leveraged companies' market value over time.
This figure shows the average Ln (market value of zero-debt companies (*ZL*)) and average Ln (market value of companies with debt on their balance sheet (*NZL*)) in the sample over the period of analysis.

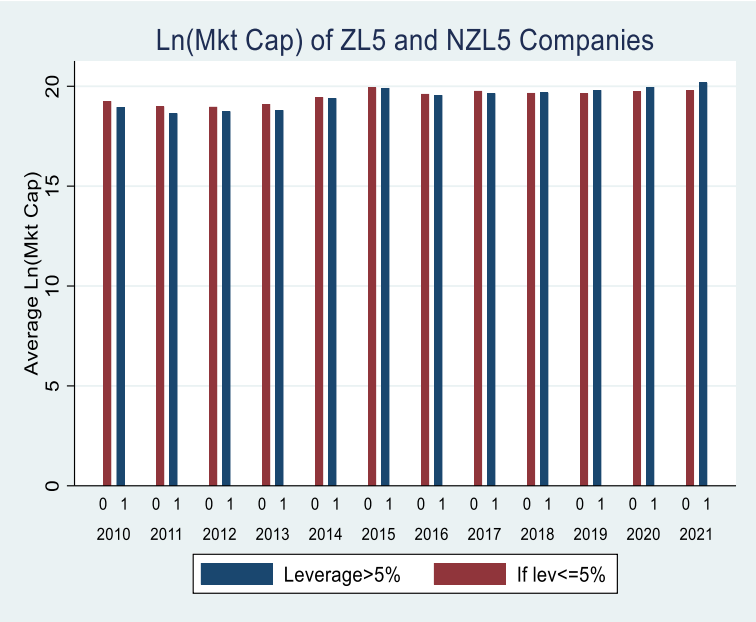

Fig. 3. Market value of low (less than 5% of total liabilities) leveraged companies and high leveraged companies (more than 5% of total liabilities) companies over time.
This figure shows the average Ln (market value of low leveraged companies (*ZL*5)) and average Ln (market value of companies with more than 5% debt over total liabilities on their balance sheet (*NZL*5)) in the sample over the period of analysis.

tendency of small firms to adopt a zero-leverage strategy (Diamond, 1991). Thus, Hypothesis 1 is confirmed for both the demand- and supply-sides.[7]

The coefficient of the variable for growth opportunities, (*GO*), which measures the future portfolio of investment, is negative and statistically significant on the demand-side in both bivariate models. These negative relationships indicate that firms are less inclined

[7] The alternative measure of firm size, *Sizeage*, corroborates our first hypothesis, although it is not reported for brevity. These findings are available upon request.

Table 1
Descriptive statistics.

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0822	0.2746	0.0000	1.0000
ZL5	0.2295	0.4205	0.0000	1.0000
NZL	0.9178	0.2746	0.0000	1.0000
NZL5	0.7705	0.4205	0.0000	1.0000
Size	19.4520	1.8663	11.5959	26.5818
Sizeage	1.0734	1.9530	−5.7566	10.1414
Tang	0.3011	0.2018	0.0000	0.9941
GO	0.3352	0.8043	−2.4675	3.0176
Liquid	2.4035	2.7552	0.00786	21.1539
ROA	0.0472	0.0696	−0.3363	0.2837
Transp1	0.4288	0.3045	0.0100	1.0000
Transp2	0.4953	0.2212	0.0125	0.9975
Transp3	0.4680	0.2819	0.0100	1.0000
Transp4	0.5139	0.2761	0.0100	1.0000
OwnCon	0.3220	0.2060	0.0000	1.0000
OwnClosely	0.2693	0.2744	0.0000	1.0000
LifeCycle	1.4237	0.4342	0.0000	3.9475
Zscore	8.0966	5.1159	−7.2049	52.469
CMKV	1.2104	0.7075	0.2367	5.1029
NDTS	0.0167	0.0179	0.0000	0.0999
DIV	0.2212	0.2182	0.0000	0.9999
SG	0.1108	0.2731	−1.0000	0.9999
WGI	−0.3384	0.1787	−0.7875	0.2335
EconFree	0.5500	0.0289	0.5030	0.6300
SMTVT	1.0682	0.6844	0.0818	2.4917

The table provides descriptive statistics for the whole sample of the variables used in the empirical analyses. We provide the mean, standard deviation, and minimum and maximum values of the variables described in Appendix C in a panel-based structure. Similar information for each country is provided in Appendix E.

to seek debt or have a higher propensity to be debt-free when they enjoy growth opportunities. Greater growth opportunities imply greater information asymmetries and more intangible assets, which are more difficult to collateralize than fixed assets. Our results confirm Hypothesis 2 on the demand-side. However, on the supply-side, the findings from the bivariate models are not statistically significant.

Our results show that an increase in asset tangibility (*Tang*) reduces the propensity to be an all-equity firm, as stated in Hypothesis 3. On the demand-side, companies with highly tangible assets are more likely to use debt or are less prone to being debt-free because they can collateralize their tangible investments. Similarly, credit suppliers are more willing to offer funding to companies with substantial tangible assets (Cantillo and Wright, 2000).

The findings regarding liquidity (*Liquid*) are not statistically significant so we therefore cannot confirm Hypothesis 4. Companies in BRICS countries do not modify their leverage based on the liquidity of their assets but on their profitability (*ROA*). Our empirical findings confirm that companies are less likely to turn to debt when their profit-generating capacity improves, implying a substitution of debt with internally generated resources, which is consistent with pecking order theory. We obtained partial support on the supply-side, suggesting that creditors are more willing to grant loans to profitable companies. Hence, while the findings provide partial support for the supply-side of debt, our fifth hypothesis is confirmed on the demand-side. Using a univariate probit model precludes the identification of this nuanced effect of *ROA* on leverage, emphasizing that a bivariate probit model with partial observability is a superior econometric technique that enables a deeper understanding of capital structure decisions.

Our empirical evidence supports hypothesis 6. In companies across the BRICS countries, greater financial transparency (*Transp*1) reduces creditors' willingness to extend debt, thereby increasing the likelihood that the company will remain unleveraged. This result confirms the importance of financial reporting quality in reducing the information gap between investors and managers. Enhanced transparency fosters the substitution of debt with equity capital. These findings imply that debt becomes less relevant as a disciplining device as financial transparency increases, which increases the propensity to be a zero-leverage firm. These findings are also consistent with those of the standard univariate probit models. However, these models lack the capacity to identify whether the driver of the relationship comes from the supply- or demand-side of debt, as bivariate probit models do. Consequently, the univariate models fail to provide a comprehensive explanation for this corner solution and capital structure decisions.

Our findings confirm that companies characterized by higher ownership concentration (*OwnCon*) demand less debt and are, therefore, more likely to be unleveraged, as stated in our seventh hypothesis. However, the findings from the bivariate probit models do not support our hypothesis on the supply-side of debt. Consequently, the higher propensity to become a zero-debt company when ownership concentration increases, which we observe in the univariate analysis, is attributed solely to demand-side rather than supply-side dynamics. These findings reinforce the limitations of univariate probit models in resolving the partial-observability problem.

The bivariate empirical evidence confirms our eighth hypothesis on a company's life cycle (*LifeCycle*), establishing that young and innovative companies in BRICS countries are more likely to have zero debt than their stagnant, mature counterparts. One of the univariate models yielded significant results for *LifeCycle*, supporting the previous findings.

Table 2
Mean-difference test between levered and unlevered companies.

Variable	NZL	ZL	Diff.	Pr(|T| > |t|)	NZL5	ZL5	Diff.	Pr(|T| > |t|)
Size	19.5436	18.4293	1.1142	0.0000	19.6388	18.8248	0.8139	0.0000
Sizeage	1.1558	0.1532	1.0026	0.0000	1.2564	0.4587	0.7978	0.0000
Tang	0.3104	0.1972	0.1132	0.0000	0.3281	0.2108	0.1173	0.0000
GO	0.2975	0.7540	−0.4565	0.0000	0.2296	0.6877	−0.4581	0.0000
Liquid	2.0675	6.1612	−4.0937	0.0000	1.6655	4.8831	−3.2176	0.0000
ROA	0.0442	0.0815	−0.0373	0.0000	0.0380	0.0785	−0.0405	0.0000
Transp1	0.4208	0.5192	−0.0984	0.0000	0.4044	0.5108	−0.1064	0.0000
Transp2	0.4893	0.5628	−0.0735	0.0000	0.4772	0.5558	−0.0785	0.0000
Transp3	0.4678	0.4704	−0.0026	0.6022	0.4668	0.4719	−0.0050	0.1282
Transp4	0.5044	0.6202	−0.1159	0.0000	0.4868	0.6043	−0.1175	0.0000
OwnCon	0.3211	0.3320	−0.0109	0.0035	0.3215	0.3237	−0.0022	0.3713
OwnClosely	0.2636	0.3318	−0.0683	0.0000	0.2617	0.2943	−0.0326	0.0000
LifeCycle	1.4216	1.4475	−0.0259	0.0009	1.4169	1.4465	−0.0295	0.0000
Zscore	7.4213	15.6475	−8.2262	0.0000	6.4922	13.4840	−6.9918	0.0000
CMKV	1.2118	1.1939	0.0179	0.1860	1.2152	1.1937	0.0216	0.0121
DIV	0.2155	0.2853	−0.0698	0.0000	0.2042	0.2785	−0.0743	0.0000
NDTS	0.0169	0.0146	0.0023	0.0000	0.0174	0.0145	0.0029	0.0000
SG	0.1126	0.0910	0.0216	0.0000	0.1149	0.0971	0.0178	0.0000

Industry Sectors	ZL	NZL	ZL5	NZL5
Basic Materials	14.74%	19.76%	15.81%	20.60%
Consumer Cyclicals	21.35%	21.91%	20.64%	22.06%
Consumer Non-Cyclicals	9.80%	8.60%	9.00%	8.58%
Energy	2.79%	3.31%	2.79%	3.44%
Healthcare	10.84%	7.27%	10.04%	6.94%
Industrials	21.27%	23.28%	23.28%	23.16%
Technology	16.41%	11.06%	15.95%	10.23%
Telecommunications Services	1.12%	1.06%	1.03%	1.02%
Utilities	1.67%	3.75%	1.56%	3.97%

The table is separated into two panels and provides the differences between leveraged and unleveraged companies in our sample.
Panel A: This panel shows the *t*-test on the equality of means between zero-debt companies (*ZL*) and levered companies (*NZL*) for all the firm-level variables used in the empirical analyses. The null hypothesis is $\mu_{x_i}^{NZL} = \mu_{x_i}^{ZL}$ for each x_i variable. Descriptions of the variables are supplied in Appendix C.
Panel B: This panel shows the proportions of leveraged (*NZL* and *NZL*5) and unleveraged (*ZL* and *ZL*5) companies in each sector included in the sample.

We argue that solvent firms operating in volatile environments, such as BRICS countries, reduce their demand for debt to cope with volatility. Our findings indicate a positive relationship between the financial risk (*ZScore*) and debt on both the demand- and supply-sides.[8] We observe that companies adopting a debt-free strategy are far from financially distressed and remain debt-free either by refraining from debt requests or by rejecting debt offerings. On the supply-side, financial creditors are expected to be reluctant to lend money to companies operating in volatile environments, increasing the likelihood of a no-debt capital structure. These findings confirm our ninth hypothesis that companies foresee being trapped in debt during financial distress. Univariate analysis confirms the relevance of financial risk in explaining companies' zero-debt decisions.

We use two proxies to measure market timing. The growth in capital market value (*CMKV*) and the non-debt tax shield (*NDTS*), which measures the capacity of the firm to issue equity capital and consequently disregard debt during periods of high market value. Our findings support the idea that, because of the undervaluation of stocks and financial constraints faced by companies operating in BRICS countries, managers are prompted to follow a strategy of lowering equity issues compared to scenarios without mispricing, as in developed countries. This finding aligns with that of Baker et al. (2003), who suggest that mispricing is more relevant for financially constrained companies. Therefore, as a firm's market capitalization improves, contrary to theoretical postulates, managers issue less equity capital and take advantage of debt. The results yielded by the bivariate and univariate probit models support the tenth hypothesis.

Our eleventh hypothesis on managerial behavior suggests that debt-averse managers prioritize dividend payment (*DIV*) to secure equity capital financing, resulting in suboptimal borrowing decisions, as stated by Meissner (2016). This argument is also supported from a contextual perspective, whereby companies operating in a growing economy like the BRICS countries, optimistic, debt-adverse managers, borrow sub-optimally despite increasing income streams. Similarly, overconfident managers may perceive their company's

[8] By construction, higher *ZScore* values represent a lower default risk.

Table 3
Univariate and bivariate probit models zero debt.

	Bivariate probit				Univariate probit	
	Model 1		Model 2		Model 1	Model 2
Variables	Demand	Supply	Demand	Supply		
	(1)	(2)	(3)	(4)	(5)	(6)
Size	0.0939***	0.4909*	0.1019***	0.4529***	0.4761***	0.4976***
GO	−0.2028**	−0.0937	−0.0927**	−0.0426	−0.3995***	−0.2904***
Tang	1.4142*	0.4669	1.0909***	0.3950**	1.4341***	1.2786***
Liquid	0.0065		0.0108		−0.0304*	−0.0201
ROA	−2.7137**	0.3245	−3.5378***	0.9158**	−0.2553	−0.5757
Transp1		−0.7978***		−0.8886***	−0.7148***	−0.7332***
OwnCon	−1.3362***	−0.1224	−1.1784***	0.1447	−0.9867***	−0.8050***
LifeCycle	−0.1868***		0.1708		0.0092	−0.4892**
ZScore	−0.1016***	−0.0941***	−0.0978***	−0.0941***	−0.1345***	−0.1391***
CMKV	0.0974*				0.1126***	
DIV			−1.646***			0.1190
NDTS	−4.385*				−1.3512	
SG			0.0527			0.8603***
WGI	0.6707	0.1709	0.3619	−0.7231*	0.4525	0.2803
SMTVT		−0.0409			0.0450	
EconFree				3.2225**		−0.2074
Brazil	3.2043***	−1.1141	0.7035***	−0.6822**	−0.1616	0.0490
Russia	0.7179	−0.4558	0.1623	−0.9598***	0.0031	−0.3691
India	0.6238**	1.0505**	0.1089	0.9615***	1.3413***	1.0836***
China	1.0039	−0.6668	0.5816**	−1.0195***	0.4989	0.1043
Intercept	1.4923**	−5.6928	1.5271***	−6.8000***	−4.3730***	−3.6420***
Obs.	32,110		39,794		32,110	39,794
Number of firms	5742		6312		5742	6312
Year dummy	YES		YES		YES	YES
Industry dummy	YES		YES		YES	YES
Log likelihood	−5700		−7754		−4475	−5959
Wald chi2	2649***		3774***		714.4***	927.3***
athrho	1.7704***		1.6383***			
	(1.1747)		(0.5896)			
lnsig2u					0.9025***	0.9476***
					(0.0872)	(0.0769)
rho	0.922***		0.834***		0.711***	0.721**

This table presents the main regressions of the econometric models. The table is divided into two sections that consist of: the bivariate probit model and the standard univariate probit model. The first section fits maximum-likelihood two-equation bivariate probit models, which allow us to analyze the determinants of the borrowing decision from the demand and supply sides, whereas the univariate probit models (in the second section) are limited in that they provide the joint effect without disentangling the impacts from the demand and supply sides. The dependent variable is *NZL*, a dummy that takes value 1 if the company has debt in its capital structure and 0 otherwise. All models consider firm- and country-level variables as described in Appendix C. Coefficients are reported and the robust standard errors are available on request. A likelihood-ratio test of the log likelihood for this model and the comparison log likelihood is presented at the end of the output for the bivariate probit models. A similar likelihood-ratio test is included at the bottom of the output for the univariate probit models; it formally tests the pooled estimator with the panel estimator. The athrho (atanhρ), which corresponds to the inverse hyperbolic tangent of rho (ρ), is also provided and computed as atanh$\rho = \frac{1}{2} ln\left(\frac{1+\rho}{1-\rho}\right)$. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

debt as undervalued and expensive, justifying the negative relationship between debt likelihood and dividend payments.[9] This result is supported by the demand-side of debt, according to the second bivariate probit model. Nevertheless, when we consider sales growth (*SG*) as our second proxy to measure managerial behavior, we find that it is not statistically significant in the bivariate probit model, despite being significant in the univariate model. In this case, the variable has a positive relationship with the propensity for debt in the capital structure. This finding suggests that overconfident managers opt to finance sales expansion with debt instead of equity capital in BRICS countries.

The empirical analysis also integrates country-level institutional variables such as the quality of the institutional system using the World Governance Indicators (*WGI*) as proxies. Our findings reveal statistically significant evidence only in the second bivariate model, suggesting that companies face greater restrictions on debt from suppliers as institutional system quality improves. As Zhang (2016) proposes, since external capital markets are not always fully efficient and perfectly competitive across countries, firms' debt financing patterns are susceptible to external constraints, and institutional arrangements consequently influence firms' aggregate debt

[9] We obtain similar results when using retained earnings instead of payout ratio.

Table 4
Marginal-effects bivariate probit model zero debt.

	Bivariate probit model 1				Bivariate probit model 2				Univariate probit model 1	Univariate probit model 2
Variables	Pr(0,0)	Pr(0,1)	Pr(1,0)	Pr(1,1)	Pr(0,0)	Pr(0,1)	Pr(1,0)	Pr(1,1)	Pr(1,1)	Pr(1,1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Size	−0.0091*	0.0027	−0.0215***	0.0278***	−0.0082***	0.0013	−0.0226***	0.0295***	0.0235***	0.0268***
GO	0.0054	0.0083**	0.0005	−0.0141***	0.0023***	0.0039*	0.0006	−0.0068***	−0.0197***	−0.0157***
Tang	−0.0348*	−0.0607**	0.0057	0.0898***	−0.0260***	−0.0479***	−0.0008	0.0747***	0.0707***	0.0690***
Liquid	−0.0001	−0.0003	0.0001	0.0003	−0.0002	−0.0005	0.0002	0.0005	−0.0015*	−0.0011
ROA	0.0488**	0.1344	−0.0690	−0.1142	0.0540***	0.1858***	−0.1161***	−0.1237***	−0.0126	−0.0311
Transp1	0.0117***	−0.0117***	0.0379	−0.0379	0.0123***	−0.0123***	0.0480***	−0.0480***	−0.0352***	−0.0396***
OwnCon	0.0282	0.0620*	−0.0205	−0.0697***	0.0202***	0.0597***	−0.0300***	−0.0499***	−0.0486***	−0.0434***
LifeCycle	0.0037*	0.0089*	−0.0037*	−0.0089*	−0.0032	−0.0084	0.0032	0.0084	0.0005	−0.0264**
ZScore	0.0034***	0.0035	0.0025	−0.0093***	0.0031***	0.0035***	0.0032***	−0.0099***	−0.0066***	−0.0075***
CMKV	0.0282	0.0620*	−0.0205	−0.0697***					0.0055***	
DIV					0.0219***	0.0570***	−0.0219***	−0.0570***		0.0064
NDTS	0.0954**	0.2312	−0.0954**	−0.2312					−0.0666	
SG					−0.0010	−0.0026	0.0010	0.0026		0.0464***
WGI	−0.0157	−0.0295*	0.0051	0.0402**	0.0032	−0.0277**	0.0459**	−0.0214	0.0223	0.0151
SMTVT	0.0006	−0.0006	0.0019	−0.0019					0.0022	
EconFree					−0.0445*	0.0445*	−0.1741**	0.1741**		−0.0112
Obs.	32,110	32,110	32,110	32,110	39,794	39,794	39,794	39,794	32,110	39,794
Number of firms	5742	5742	5742	5742	6312	6312	6312	6312	5742	6312
Year dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

This table provides the average marginal effects of the corresponding bivariate probit model and standard probit model exhibited in Table 3. The dependent dummy variable is *NZL*, which takes value 1 if the company has debt in its capital structure and 0 otherwise. All models consider firm- and country-level variables as described in Appendix C. In each model, the average marginal effect (dy/dx) is reported. The robust, delta-method standard error are available on request. The bivariate probit models provide four marginal effects corresponding to the joint probabilities for the cases in which the firm wants to resort to debt and the creditor wants to grant debt $[Pr(y_1 = 1, y_2 = 1)]$; the firm does not want to resort to debt and the creditor is not willing to give credit $[Pr(y_1 = 0, y_2 = 0)]$; the company does not want to resort to debt but creditors are willing to grant credit $[Pr(y_1 = 0, y_2 = 1)]$, which corresponds to the financial-flexibility hypothesis; and the company wants to resort debt but creditors are not willing to grant credit $[Pr(y_1 = 1, y_2 = 0)]$, which corresponds to the financial-constraints hypothesis. The sum of all marginal probabilities for each variable equals zero. The standard univariate probit models are able to capture only the joint probabilities in the case in which the firm wants to resort to debt and creditors want to grant credit $[Pr(y_1 = 1, y_2 = 1)]$. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

levels. Companies mitigate systematic risk when institutional systems enhance regulatory quality, thereby improving control over managerial self-dealing, political stability, and the rule of law. This, in turn, facilitates entry into equity capital markets and reduces the likelihood of debt issuance in exchange for equity when *WGI* improves. This is contrary to our hypothesis H12s.

We observe a distinct institutional setting in India that seems to facilitate a higher degree of leverage among its companies compared with other countries within our sample. This phenomenon can be attributed to India's adoption of a common law legal regime, which is associated with more market-oriented decision-making, as suggested by Cline et al. (2021). Consequently, it is reasonable to infer that Indian companies may exhibit fewer concerns about financial flexibility and encounter fewer financial constraints than companies from other countries in our dataset.

We find evidence supporting the hypothesis that economic freedom (*EconFree*) shapes debt decisions for unlevered companies in BRICS countries. In the second bivariate probit model, as economic freedom increases within a country, creditors are more likely to grant loans to the corporate sector. This implies a reduced probability of companies remaining unleveraged, as suggested by H13s. Nevertheless, development of the financial system (*SMTVT*) did not exhibit a statistically significant coefficient. *WGI* variable as well as *EconFree* and *SMTVT* are non-significant in the univariate analysis, reinforcing the idea that the bivariate model can deal with the partial-observability problem. These last three variables collectively provide an enriched perspective on how country-level institutional variables shape zero-leverage policies in our sample of BRICS companies. This analysis provides novel insights into the existing literature.

4.2.2. Marginal effects of bivariate versus univariate probit models of zero debt

Table 4 reports the marginal effects of the bivariate and standard univariate probit models. The table lists the marginal effects with p-values ($p > |z|$) marked with an asterisk. The bivariable probit model provides four marginal effects corresponding to the joint probabilities of the firm willing to seek debt, while the creditor is willing to grant it credit [$Pr(y_1 = 1, y_2 = 1)$]; the scenario in which neither the firm nor the creditor favors debt [$Pr(y_1 = 0, y_2 = 0)$]; the case in which the company is reluctant to demand debt but the creditor is willing to grant it [$Pr(y_1 = 0, y_2 = 1)$], which corresponds to the financial flexibility hypothesis; and the situation where the company desires debt but the creditor is unwilling to grant it [$Pr(y_1 = 1, y_2 = 0)$], which corresponds to the financial constraints hypothesis. The sum of all marginal probabilities for each variable is equal to zero. Table 4 provides information that allows us to assess the marginal effects in all these scenarios.

4.2.2.1. The company wants credit and the creditor willing to supply it. First, we interpret the marginal effect corresponding to the joint probabilities when firms desire debt and creditors are willing to grant it [$Pr(y_1 = 1, y_2 = 1)$], which is comparable to standard univariate probit models. In Table 4, both the bivariate and univariate probit models indicate that a 1%age point increase in company size (*Size*) is associated with an almost 3 percentage point increase in the probability of having debt. However, a 1 percent increase in growth opportunities (*GO*), exhibits a marginal effect that echoes the decline in the probability of debt, equal to an average of 1.0 percentage points in the two bivariate probit models and an average of 1.8 percentage points in the univariate probit models. This negative relationship between *GO* and the probability of debt is consistent with the inability to collateralize growth opportunities, among other reasons. The opposite effect is observed with asset tangibility (*Tang*), which exhibits a positive and statistically significant average marginal effect of 0.0823 in the univariate probit models and 0.0699 in the bivariate probit models, suggesting that the probability of credit being granted increases by approximately 7–8 percentage points when tangibility increases by 1 percentage point. Unlike growth opportunities, tangible assets are collateralizable, facilitating access to the credit market.

One interesting finding is that for company profitability (*ROA*). Standard univariate probit models did not report any significant marginal effects. However, the second bivariate probit model reveals that when profitability increases, the joint probability that a company demanding credit will be granted decreases significantly. In the same vein, the variable that measures a company's life cycle (*LifeCycle*) is statistically significant at 10% level in the first bivariate but not in the univariate probit models. This finding indicates that younger firms have a lower propensity to borrow when creditors are willing to lend. The results for *ROA* and *LifeCycle* highlight the shortcomings of the standard univariate probit models in disentangling the demand and supply dynamics of debt in comparison with the bivariate probit model, which can deal with the partial observability of the debt decision.

In the bivariate probit models, when creditors are willing to grant credit, companies exhibit a reduction in their joint probability of having debt by approximately 4.99 and 6.97 percentage points when the concentration of shares in the hands of the majority shareholder (*OwnCon*) increases by 1 percentage point. The univariate models also show a decrease in the probability between 4.34 and 4.86 percentage points, with all else being equal. Table 4 also indicates that as the solvency (*ZScore*) increases by one unit, the probability of debt decreases by between 0.66 and 0.99 percentage points in the univariate and bivariate probit models, respectively. Regarding the earnings quality or transparency of financial reporting (*Transp*1), we find that the probability of having debt when creditors are willing to supply credit decreases by 4.80 percentage points according to the bivariate probit model and between 3.52 and 3.96 percentage points according to the univariate probit model when the financial transparency measure increases by 1 percentage point.

The first measure of market timing (*CMKV*) is statistically significant in the bivariate probit model when firms desire debt and creditors are willing to grant it, [$Pr(y_1 = 1, y_2 = 1)$]. The marginal effect indicates that as market capitalization grows by 1 percentage point, the probability of being leveraged decreases by 6.97 percentage points. However, the opposite finding was observed when using the standard univariate model. In this case, the marginal effect is positive, corresponding to 0.55 percentage points. The second measure of market timing (*NDTS*) lacks statistical significance in both the bivariate and univariate probit models.

The final statistically significant firm-level variable is the dividend payout ratio (*DIV*) as proxy for managerial behavior. Based on

the bivariate probit model, this variable is negatively correlated with the propensity to borrow when creditors are willing to grant it by 5.70 percentage points as the payout ratio increases by one percentage point. The standard univariate probit model does not show a statistically significant relationship between *DIV* and the probability of borrowing when creditors are willing to grant credit. Again, this comparative analysis reinforces the limitation of the univariate model in addressing the partial observability of the debt decision-making process.

None of the country-level variables (*WGI*, *SMTVT*, and *EconFree*) were statistically significant in the univariate probit models. The limitations of this econometric technique prevent us from capturing the joint effect that encompasses the demand- and supply-sides of debt. However, the bivariate probit models provide evidence that the joint probability that a company requiring debt is granted with it $[Pr(y_1 = 1, y_2 = 1)]$ is correlated with *WGI* and *EconFree* (*SMTVT* is not statistically significant). We observe that, when the quality of the institutional system improves or economic freedom increases, the propensity for debt also increases. We include country, industry, and time controls in the models to address misspecification risks.

4.2.2.2. Financial flexibility: the company does not want credit although the creditor is willing to supply it. Financial flexibility occurs when companies are not willing to get debt, but creditors are willing to grant credit $[Pr(y_1 = 0, y_2 = 1)]$. We analyze the financial flexibility hypothesis using bivariate probit models with partial observability and report the results in Columns 2 and 6 of Table 4. To the best of our knowledge, this is the first study to formally test this hypothesis.

Iliasov and Kokoreva (2018) contend that the primary driver of a firm's decision to adopt a zero-debt capital structure is financial flexibility regarding demand-side debt. Similarly, Yasmin and Rashid (2019) suggest that financial conservatism or financial flexibility is a strategic choice for building reputation for Pakistani firms. They argue that financial flexibility is especially important in a developing economy in which business risk is high and financial markets are highly unpredictable. Our findings support this hypothesis and suggest that the probability of abstaining from debt when creditors are willing to grant credit increases with the company's growth opportunities (*GO*), profitability (*ROA*), ownership concentration (*OwnConc*), financial health (*ZScore*), market capitalization growth (*CMKV*), dividend payout ratio (*DIV*), and degree of economic freedom (*EconFree*) within the country. Additionally, young companies (*LifeCycle*) are more likely to exhibit a financial flexibility strategy than mature companies. The probability of following a financially flexible strategy decreases with asset tangibility (*Tang*), transparency of financial statements (*Transp*1), and improvement in the quality of the country's regulatory system (*WGI*). Profitability (*ROA*) shows that a 1 percentage point increase in return on assets is associated with an 18.58 percentage increase in the probability of having no debt when creditors are willing to grant credit, according to column 6 of Table 4. Similarly, a 1 percentage point increase in growth opportunities or in the ownership concentration generates a 0.83% or a 6.2% increase in the probability of adopting a financial flexibility strategy, respectively. For each 1 percentage point of increase in firms' market value, the chance that the firm adopts a financial flexibility strategy increases 6.2%.

4.2.2.3. Financial constraints: the company wants credit although the creditor is not willing to supply it. The financial constraints hypothesis becomes relevant when companies are willing to obtain debt, but creditors are not interested in financing their operations. We analyze this hypothesis $[Pr(y_1 = 1, y_2 = 0)]$ using bivariate probit models with partial observability and report the results in Columns 3 and 7 of Table 4. Becoming an unleveraged company due to financial constraints is primarily influenced by the supply-side. In the context of adverse selection and moral hazard, as in emerging markets, companies with weaker reputations encounter financial constraints because of the associated challenges of expensive borrowing and higher barriers to securing credit (Diamond, 1991). The results in Table 4 provide evidence that the probability of facing financial restrictions because creditors are unwilling to lend decreases as the size of the company increases and as they increase their payout ratio or their non-debt tax shields. Improvements in a country's economic freedom also contribute to reducing financial restrictions. Other factors that contribute to reducing financial restrictions, although significant in only one of the models, are a firm's profitability, ownership concentration, and life cycle. Transparency in financial statements, company solvency, and the quality of the regulatory system, are factors that increase the chances of facing financial restrictions, although they are only significant in one model. Thus, an increase of 1% in size reduces the chance of becoming financially constrained by 2.2%. An increase of 1% in payout ratio or non-debt tax shields is associated with a reduction in the probability of being financially constrained by 2.2% or 9.5%, respectively.

Theoretically, the financial flexibility and financial constraints hypotheses serve as complementary explanations of zero-leverage decisions. As expected from Table 4, the marginal effects for most variables used to test both hypotheses exhibit opposite signs. For example, when comparing Columns 2 with 3 or 6 with 7. The exceptions are growth opportunities (*GO*) and financial risk (*ZScore*). The financial health variable influences decisions in the same direction for both the financial flexibility and financial constraints hypotheses. In emerging markets, as corporate default risk escalates, the probability decreases that a company will remain unleveraged when the creditor is willing to supply funds or when the company is willing to issue debt but creditors are not willing to grant loans. Table 4 further reveals that among the four joint probabilities, the financial flexibility hypothesis scenario $[Pr(y_1 = 0, y_2 = 1)]$ dominates both cases where the company desires debt and obtains it $[Pr(y_1 = 1, y_2 = 1)]$ and under the financial constraints hypothesis $[Pr(y_1 = 1, y_2 = 0)]$. This is evident in the observed estimated marginal effect of *ZScore*, which has the highest absolute value (see Columns 2 and 6, which exhibit a marginal effect of 0.0035). Additionally, financial risk is negatively associated with the joint probability that a company refrains from seeking debt when creditors are unwilling to grant loans $[Pr(y_1 = 0, y_2 = 0)]$.

4.3. Robustness analysis for low-leverage companies

We take the final step with a robustness analysis by focusing on low-leverage companies, defined as those with less than 5% debt in

their balance sheets. In Table 5, we replicate Table 3 with the bivariate and standard univariate probit models by using *NZL*5 as a dummy dependent variable that takes value 1 if the company has more than 5% debt in its capital structure and 0 otherwise. This variable captures firms with low, rather than zero, leverage.

Regarding multiple aspects, the findings in Table 5 are qualitatively consistent with those in Table 3. First, the null hypothesis that $\rho = 0$ is rejected, suggesting again that the correlation between the outcomes obtained from the demand- and supply-side regressions is significant according to the bivariate probit model. This indicates that the estimations should be run jointly, rather than employing independent standard univariate probit models, which cannot deal with the partial observability of debt decisions.

Second, for the standard univariate probit model, the directions of the impact of each statistically significant variable on the probability of being leveraged (*NZL*5) are the same as those in Table 3, except for profitability (*ROA*), which in this case is statistically significant, and liquidity position (*Liquid*), which loses significance. This suggests that profitable companies are more likely to be leveraged. Nevertheless, the standard univariate probit model does not provide conclusive insights into whether these findings are attributable to demand- or supply-side decisions. Only when we look at the more informative bivariate probit model do we gain clarity that the greater propensity to be a non-low-leverage company is determined by the return on assets (*ROA*) and the company's liquidity (*Liquid*), as both variables are statistically significant.

Third, as shown in Table 3 on the demand-side, the bivariate probit model in Table 5 shows that the propensity to be a leveraged

Table 5
Univariate and bivariate probit models near zero debt.

	Bivariate probit				Univariate probit	
	Model 1		Model 2		Model 1	Model 2
Variables	Demand	Supply	Demand	Supply		
	(1)	(2)	(3)	(4)	(5)	(6)
Size	0.5180***	−0.0022	0.4554***	−0.0054	0.3601***	0.3480***
GO	0.4483***	−0.2372***	0.4454***	−0.2379***	−0.2707***	−0.1739***
Tang	2.3359***	0.4505***	1.8667***	0.4650***	1.5087***	1.1974***
Liquid	−0.0668***		−0.0765***		0.0170	0.0279
ROA	−2.4869***	2.2081***	−3.1853***	2.4378***	2.3713***	1.8248***
Transp1		−0.8854***		−0.9242***	−1.0671***	−1.0343***
OwnCon	0.1807	−0.9252***	0.4296**	−0.6486***	−0.7523***	−0.3558**
LifeCycle	0.2009**		−0.0820		0.1162**	−0.6978***
ZScore	0.0975***	−0.3419***	0.1192***	−0.3243***	−0.4971***	−0.4700***
CMKV	−0.0567				0.1312***	
DIV			−0.3217			0.6136**
NDTS	−5.8863*				−2.1850	
SG			0.6867*			1.2238***
WGI	−0.1487	0.4197**	0.0010	0.4765***	0.2970	−0.3962
SMTVT		−0.0274			−0.0108	
EconFree				−1.9969***		0.2067
Brazil	−1.0638	0.4065*	−0.5596*	0.4514***	0.5743	0.6148**
Russia	−1.1112**	1.1280***	−0.5067	0.8438***	0.6408	0.0236
India	0.7932***	0.4365***	0.9030***	0.2760***	1.3699***	1.0297***
China	−1.3132***	0.5636***	−0.8150**	0.4456***	0.6050**	0.1434
Intercept	−8.3271***	4.2912***	−7.3835***	5.3589***	−1.5395**	−0.5794
Obs.	32,110		39,794		32,110	39,794
Number of firms	5742		6312		5742	6312
Year dummy	YES		YES		YES	YES
Industry dummy	YES		YES		YES	YES
Log likelihood	−9320		−12,050		−7169	−9185
Wald chi2	6056***		7848***		1225***	1694***
athrho	−0.2056**		−0.1310			
	(0.0949)		(0.0913)			
lnsig2u					1.2553***	1.2027***
					(0.0671)	(0.0586)
rho	−0.203***		−0.130***		0.778***	0.769**

This table replicates Table 3 but uses *NZL*5 as the dependent variable, a dummy that takes value 1 if the company has more than 5% debt in its capital structure and 0 otherwise. The table is divided into two sections: the bivariate probit model and the standard univariate probit model. The first section fits a maximum-likelihood two-equation bivariate probit model that allows us to analyze the determinants of the borrowing decision from the demand and supply sides, whereas the univariate probit model is limited in that it provides the joint effect without disentangling the impacts from the demand and supply sides. All models consider firm- and country-level variables as described in Appendix C. Coefficients are reported and the robust standard errors are available on request. A likelihood-ratio test of the log likelihood for this model and the comparison log likelihood is presented at the end of the output for the bivariate probit models. A similar likelihood-ratio test is included at the bottom of the output for the univariate probit model, which formally tests the pooled estimator with the panel estimator. The athrho (atanhρ), which corresponds to the inverse hyperbolic tangent of rho (ρ), is also provided and computed as atanh$\rho = \frac{1}{2} ln\left(\frac{1+\rho}{1-\rho}\right)$. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table 6
Marginal-effects bivariate probit model near zero debt.

	Bivariate probit model 1				Bivariate probit model 2				Univariate probit model 1	Univariate probit model 2
Variables	Pr(0,0)	Pr(0,1)	Pr(1,0)	Pr(1,1)	Pr(0,0)	Pr(0,1)	Pr(1,0)	Pr(1,1)	Pr(1,1)	Pr(1,1)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Size	−0.0026*	−0.0166***	0.0029	0.0162***	−0.0026**	−0.0159***	0.0034*	0.0151***	0.0304***	0.0310***
GO	−0.0017	−0.0148***	0.0349***	−0.0183***	−0.0020**	−0.0161***	0.0364***	−0.0183***	−0.0229***	−0.0155***
Tang	−0.0124*	−0.0737***	−0.0505***	0.1366***	−0.0120***	−0.0638***	−0.0553***	0.1311***	0.1275***	0.1065***
Liquid	0.0003	0.0021***	−0.0003	−0.0021***	0.0004**	0.0027***	−0.0004**	−0.0027***	0.0014	0.0025
ROA	0.0080	0.0838***	−0.3162***	0.2245***	0.0124**	0.1169***	−0.3651***	0.2358***	0.2004***	0.1623***
Transp1	0.0017**	−0.0017**	0.1219***	−0.1219***	0.0023***	−0.0023***	0.1314***	−0.1314***	−0.0902***	−0.0920***
OwnCon	0.0009	−0.0076	0.1282***	−0.1216***	−0.0009	−0.0166**	0.0947***	−0.0773***	−0.0636***	−0.0316**
LifeCycle	−0.0010	−0.0064**	0.0010	0.0064**	0.0005	0.0029	−0.0005	−0.0029	0.0098**	−0.0621***
ZScore	0.0002	−0.0038***	0.0475***	−0.0440***	0.0001	−0.0050***	0.0468***	−0.0420***	−0.0420***	−0.0418***
CMKV	0.0003	0.0018	−0.0003	−0.0018					0.0111***	
DIV					0.0019	0.0112	−0.0019	−0.0112		0.0546**
NDTS	0.0291	0.1881	−0.0291	−0.1881					−0.1847	
SG					−0.0040	−0.0239	0.0040	0.0239		0.1088***
WGI	−0.0001	0.0056	−0.0585**	0.0530**	−0.0012	0.0011	−0.0677***	0.0678***	0.0251	−0.0352
SMTVT	0.0001	−0.0001	0.0038	−0.0038					−0.0009	
EconFree					0.0050**	−0.0050**	0.2839***	−0.2839***		0.0184
Obs.	32,110	32,110	32,110	32,110	39,794	39,794	39,794	39,794	32,110	39,794
Number of firms	5742	5742	5742	5742	6312	6312	6312	6312	5742	6312
Year dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country dummy	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

The table provides the average marginal effects of the corresponding bivariate probit model and standard probit model exhibited in Table 5. The dependent variable is a dummy, *NZL*5, that takes value 1 if the company has more than 5% debt in its capital structure and 0 otherwise. The models consider firm- and country-level variables as described in Appendix C. In each model, the average marginal effect (dy/dx) is reported. The robust, delta-method standard error are available on request. The bivariable probit model provides four marginal effects corresponding to the joint probabilities for the cases in which the firm wants to resort to debt and the creditor wants to grant credit $[Pr(y_1 = 1, y_2 = 1)]$; the firm does not want to resort to debt and the creditor is not willing to give it credit $[Pr(y_1 = 0, y_2 = 0)]$; the company does not want to resort to debt but the creditor is willing to grant it $[Pr(y_1 = 0, y_2 = 1)]$, which corresponds to the financial-flexibility hypothesis; and the company wants to resort to debt but the creditor is not willing to grant it $[Pr(y_1 = 1, y_2 = 0)]$, which corresponds to the financial-constraints hypothesis. The sum of all marginal probabilities for each variable equals zero. The standard univariate probit model is able to capture only the joint probabilities for the case in which the firm wants to resort to debt and the creditor wants to grant credit $[Pr(y_1 = 1, y_2 = 1)]$. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

company increases for bigger companies (*Size*). It is worth noting that growth opportunities (*GO*) drive the decision to follow a leveraged capital structure for the demand- and supply-sides of debt differently. Indeed, on the demand-side, growth opportunities increase the likelihood of being leveraged, whereas on the supply-side, this likelihood decreases as growth opportunities rise. This differential effect was not observed in univariate probit models. Likewise happens with the profitability measure (*ROA*) which exhibits an asymmetric impact on the likelihood of being a leveraged company. This likelihood tends to decrease on the demand-side, and increase on the supply-side. Similarly, the second bivariate probit model shows the differential impact of the ownership structure (*OwnCon*) on the likelihood of being a leveraged company. On the demand-side, this propensity increases as a company's structure becomes more concentrated. On the supply-side, however, this relationship is driven in the opposite direction.

Regarding the institutional variables, we observe differences from the results obtained when considering only debt-free companies. That is, as debt level is above 5% (*NZL*5), we observe changes in the impact of economic freedom (*EconFree*) and the world governance indicator (*WGI*). Specifically, improvements in a country's Economic Freedom Index reduce the propensity of the supply-side to have debt exceeding 5%, then as economic freedom improves, financial restrictions become more relevant. Similarly, we observe that the country dummies for Brazil, Russia, and China behave differently when the independent variable does not include unleveraged companies. For example, financial flexibility becomes relevant in China when companies begin using debt to finance their investments. Additionally, considering that South Africa is the omitted reference group, India's institutional environment consistently positively impacts on the propensity to have debt from both the demand- and supply-sides. These findings align with the idea that the institutional setting is also related to the development of financial markets, as argued by Cline et al. (2021).

When focusing only on companies with more than 5% of debt, our findings indicate that enhancements in governance at country level increase the propensity to have debt from the supply-side. Thus, if the dependent variable excludes less indebted companies, our results show that improvements in governance quality at the country level increase the likelihood of debt supply, whereas improvements in economic freedom decrease this likelihood. When considering country-level variables, these findings offer valuable insights into the differential impact of institutional arrangements on zero-debt companies relative to those with low leverage. All other findings remain qualitatively consistent with those reported in Table 3.

The final part of the robustness check shows the marginal effects listed in Table 6. This table provides the marginal effects at the mean of each variable for the bivariate probit model and corresponding standard univariate model. As mentioned, the standard univariate probit model is not capable of disentangling debt decisions, but provides information only when firms want debt and creditors grant credit $[Pr(y_1 = 1, y_2 = 1)]$.

From the univariate probit models reported in Tables 4 and 6, the probability of being a leveraged company (*NZL*5) increases marginally with the company's size (*Size*), asset tangibility (*Tang*), profitability (*ROA*), default risk (*ZScore*), market value growth (*CMKV*), dividends (*DIV*), and sales growth (*SG*). These results are like those found using the bivariate probit model when the company is willing to receive funding and the creditor is willing to grant it, as shown in Columns 4–8 of Table 6.

Additionally, Table 6 provides a framework for formal testing of the financial flexibility $[Pr(y_1 = 0, y_2 = 1)]$ and financial constraints hypotheses $[Pr(y_1 = 1, y_2 = 0)]$ as discussed in Section 4.2.2. These results also serve as robustness tests for the main findings (Table 4). For brevity, we concentrate only on the most appealing results. First, financially flexible companies in BRICS countries tend to be leveraged companies as their liquidity improves (*Liquid*), profitability increases (*ROA*), mature in their business cycles (*LifeCycle*), and are far from default (*ZScore*). The opposite relationships are observed for financially constrained companies. Additionally, the marginal effects show that the probability of being a leveraged company for financially flexible firms is lower for those with significant growth opportunities (*GO*) and those who are financially opaque (*Transp*1). Similarly, these relationships are driven in the opposite direction for financially constrained firms.

Our findings on a firm's tangibility of assets (*Tang*) are noteworthy. In this case, the variable exhibits a negative and statistically significant impact on the probability of being a leveraged company, applicable to both financially flexible and financially constrained firms. Although this finding may seem counterintuitive, a closer inspection of Table 6 shows that both hypotheses are dominated by the scenario in which the company requests debt and successfully secures it from creditors, $[Pr(y_1 = 1, y_2 = 1)]$. This finding is also supported by the univariate analysis results shown in the last two columns of the table.

5. Discussion and final remarks

The zero-leverage corporate decision is an anomaly that has not received systematic attention in developing countries. This study analyzes this decision using a sample of companies from the BRICS countries for the period 2010–2021. Unlike most prior analyses, this study follows Morais et al. (2020) by employing a bivariate probit model with partial observability, as in Poirier (1980). The bivariate probit model allowed us to disentangle the bivariate decision-making process in which the company can obtain debt or not, and the creditor may grant credit. This study is the first of its kind to analyze decisions in a representative sample of companies from emerging nations with growing economic power.

The univariate results align with the bivariate results, and confirm that the odds of becoming an unleveraged company in a BRICS country increase when the company has a more concentrated ownership structure, more growth opportunities, better financial health, and greater financial transparency. Conversely, this probability decreases with size and tangibility. Companies with fewer conflicts of interest between managers and shareholders, and those with higher volumes of tangible assets, are expected to enjoy more expedited access to credit markets. Firms with highly tangible assets are more likely to seek and secure debt because lenders favor these companies as well as those with fewer growth opportunities, which are intangible and less likely to be collateralized, as Cantillo and Wright (2000) argue. Thus, the bivariate probit model shows that firms demand less debt in the earliest stages of their life cycle and/or if

managers are debt-averse, and credit suppliers provide resources to companies without the best financial reporting records if they operate in countries with good institutional quality and economic freedom.

Our results also align with those of Michaelas et al. (1999), who identify greater barriers to credit markets for small and medium-sized firms because they face higher marginal interest rates and bankruptcy costs. Similarly, because size is inversely related to information asymmetries, large companies exhibit more transparency and better-quality financial information. In addition, the negative relationship between growth opportunities and debt levels reinforces arguments related to informational asymmetries and the non-collateralization of growth opportunities (Cantillo and Wright, 2000; Jensen, 1986; Shleifer and Vishny, 1992). However, financially healthy firms exhibit a higher propensity to become unleveraged because they demand and receive less debt. Firms rely less on debt financing if their information improves (Chang and Yu, 2010; Hirshleifer, 1971). This finding contradicts the results of Dang (2013) and Bessler et al. (2013). The bivariate probit model for these variables facilitates the distinction between whether the effect comes from the demand or supply-side, and whether the company pursues a financial-flexibility strategy or faces financial restrictions.

A key contribution of our study is that it provides empirical evidence on the relevance of both the financial flexibility and financial constraints hypotheses in explaining the leverage decisions of companies in BRICS countries. Our findings confirm that the probability of adopting a zero-debt policy because of the financial-flexibility strategy decreases with asset tangibility and transparency, but increases with dividends, growth opportunities, ownership concentration, market value growth, and financial health and as the country becomes economically freer. Improvements in a country's institutional quality help reduce the need for financial flexibility. Younger firms are more likely to adopt a financial-flexibility strategy than are mature firms. Our results confirm Iliasov and Kokoreva's (2018) argument that financial flexibility is one of the main drivers of zero-debt choice on the demand-side. We also confirm Yasmin and Rashid's (2019) that financial flexibility is a strategic choice to build reputation, particularly for young profitable companies with growth opportunities.

Moreover, the probability of companies having zero debt because of financial restrictions is observed to be lower for bigger companies that are profitable, whose ownership is concentrated, pay greater dividends, and exhibit greater non-debt tax shields. An improvement in a country's economic freedom reduces the odds of financial restrictions. However, firms with good reporting policies and financial health that operate in countries with high-quality regulatory systems have a higher chance of becoming financially restricted. These results offer an additional insight to that of Lefebvre (2021), as we document that promising young firms are subject to financial restrictions when they need funds for startup projects (with $\alpha = 10\%$). Additionally, in line with Crisóstomo et al. (2014), we acknowledge that financial restrictions relate to corporate reputation, particularly financial health and transparency.

We acknowledge that this study has limitations that open the door for further research. First, there is limited literature on certain corporate dynamics of zero-debt firms, such as corporate governance and financially sustainable decision-making. The enhanced availability of information on these issues for companies in emerging countries would deepen our understanding of the broad characteristics that shape capital structure decisions. Furthermore, the institutional variables merit further exploration given that our results show asymmetric behavior between the corner solutions of zero-debt firms and those with small proportions of debt in their capital structures. Additionally, we propose a future research line focusing on the specific behaviors of companies in China and India as their institutional arrangements diverge. These countries could serve as suitable quasi-experiments to analyze the impact of the institutional framework and dilucidated how the decision-making process on capital structure is shaped by unexpected events like the COVID-19 pandemic. Moreover, exploring the relationship among value, capital structure, and economic freedom in emerging countries, where the institutional setting differs from that of developed countries, holds promise for fruitful exploration.[10] We suggest that researchers analyze such aspects of zero-leverage firms vis-à-vis leveraged companies. We do not consider specific governance tools, such as the nature of family firms, which have unique governance features. Hence, future research could analyze the zero-leverage decisions of family-owned firms.

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CRediT authorship contribution statement

Paolo Saona: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. **Pablo San-Martin:** Conceptualization, Data curation, Supervision, Validation, Writing – original draft, Writing – review & editing. **Eleuterio Vallelado:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.
Source files and methodology EMR (Reference data) (Mendeley Data)

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Appendix A. Literature review on BRICS countries' corporate sector

This table summarizes the literature on the zero-debt decision for BRICS countries collectively and individually.

Authors	Main contributions/arguments
BRICS	
Almeida (2010)	Brazil and Russia stand out as major suppliers of primary products, while India and China are focused on production technologies and South Africa is the most industrialized and technologically advanced economy in Africa (being a major producer of precious and basic metals, agricultural goods, and military equipment).
Öztekin and Flannery (2012)	The BRICS group is seen as a bloc, and firms from the different countries differ in both the costs and benefits of attaining target leverage. A firm's capital structure reflects not only the firm's characteristics but its country's institutional environment and traditions.
Sharma et al. (2017)	China has substantially converged with IFRS standards (International Financial Reporting Standards), but it has no timetable for completing the process. Similarly, Indian Accounting Standards have substantially converged with IFRS, but India has not adopted IFRS standards for domestic companies' reporting and has not yet formally committed to adopting these standards.
Dolgikh (2017)	The adoption of IFRS has been recognized as an opportunity to increase the mobility of capital, create standardized and understandable financial statements from the perspective of different economies, and satisfy stakeholders' need for useful and clear information.
Jash (2017)	BRICS is an informal group that does not act in a coordinated manner but affects world trade and has held annual summit meetings since 2009 in an attempt to cooperate on multisectoral issues of mutual interest.
Reddy (2022)	BRICS countries, with the partial exception of South Africa, have become more nationalist and authoritarian from the point of view of Western countries.
BRAZIL	
Sakai de Macedo et al. (2015)	Financial flexibility is one of the main factors explaining Brazilian companies' capital structure.
Lima et al. (2011)	There is a clear relationship between macroeconomic indicators and the capital structure of Brazilian companies, and it could help to explain why some of those firms avoid debt financing.
Santos-Silva et al. (2016)	In Brazilian companies, the main determinants of capital structure do not affect long-term debt decisions.
RUSSIA	
Metel'skaya (2021)	Traditional theories of capital structure fail to explain the capital structure of Russian firms. The author argues that macroeconomic factors and market development have a large role in explaining debt financing and, consequently, the prominence of all-equity firms.
INDIA	
Deb and Banerjee (2015)	Firms with zero debt exhibit considerable flexibility in their capital structure, have higher cash reserves, have more growth opportunities, and are perceived more positively by market participants and consequently rewarded with higher risk-adjusted stock returns.
Ghose and Kabra (2016)	The authors distinguish between constrained and unconstrained Indian firms as a factor underlying the no-debt decision. Macroeconomic conditions are countercyclically related to firms' zero-debt policy.
Deb and Banerjee (2018)	Indian companies adopt an almost-zero-leverage policy to attain financial flexibility, even though it could be seen as a suboptimal decision given the lucrative tax shield.
CHINA	
Huang et al. (2017)	China has followed the general trend of corporate deleverage, and in 2012 debt-free companies reached 20.73% of all listed firms. Firms without external financing needs are positively associated with zero-leverage policy. Zero-leverage policy is supported by government regulation, financial constraints, and financial flexibility.

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Authors	Main contributions/arguments
Nazarova and Budchenko (2020)	The Chinese economy's peculiar institutional structure, systemic risks, and characteristics that are different from other developing countries are the main causes of differences in capital structure between firms in China and other BRICS countries.
SOUTH AFRICA	
Khémiri and Noubbigh (2018)	South African companies' leverage decisions are constrained by the macroeconomic environment and government regulation.
OTHER EMERGING COUNTRIES	
Kokoreva and Ivanova (2016)	The authors analyze the zero-debt capital structure of firms in emerging markets in eastern Europe to highlight that the impact of capital-structure determinants differs within each nation included in their sample.
Iliasov and Kokoreva (2018)	The authors study 21 emerging markets, focusing on the financial-constraints and financial-flexibility hypotheses.

Appendix B. Hypotheses

This appendix summarizes our hypotheses and classifies them as demand side or supply side.

Zero-debt determinants	Financial flexibility hypotheses (demand side)	Financial constraints hypotheses (supply side)
1. Company size	The literature shows that firm size is pivotal in shaping the leverage decision (Harris and Raviv, 1991; Titman and Wessels, 1988). Large companies are more likely to demand debt because they exhibit reduced asymmetric-information issues, resulting in lower transaction costs and better terms in debt contracts (Bigelli et al., 2014; Booth et al., 2001; de Jong et al., 2008; Frank and Goyal, 2009). Conversely, smaller firms face higher borrowing costs and are therefore likely to demand less debt (Bigelli et al., 2014). H1d: As firm size increases, the probability of becoming leveraged increases.	Creditors are more willing to lend to larger companies (Hadlock and Pierce, 2010), because they consider larger companies to be more visible and to have more robust financial reputations. H1s: Smaller companies have a higher probability of facing financial restrictions and adopting a low-leverage policy.
2. Growth opportunities	A project with a net present value that is not sufficient for the firm to pay off debt is forgone because the shareholders would earn nothing (Lai, 2011). Either because companies avoid debt to reduce creditors' monitoring or because companies opt to minimize financing costs, it suggests a negative relationship between the portfolio of growth options and borrowing. Additionally, a firm could use its growth opportunities to signal its quality by issuing new stocks (Korajczyk and Levy, 2003; Titman and Wessels, 1988), implying a negative association between growth opportunities and the demand for debt (Bigelli et al., 2014; Myers, 1977). H2d: The greater the growth opportunities in a fast-growing economy, the greater the propensity for zero-leverage behavior.	Creditors are less willing to lend to companies whose value depends mainly on growth opportunities (Morais et al., 2020; Shleifer and Vishny, 1992). The value associated with these opportunities is difficult to collateralize (Cantillo and Wright, 2000), increasing the information asymmetries between the company and creditors. H2s: Creditors are less willing to lend to companies with high growth opportunities, increasing the propensity for such companies to become unleveraged.
3. Asset tangibility	Companies with a significant proportion of fixed assets may opt to increase their debt because tangible assets can be collateralized (Benmelech and Bergman, 2009; Bigelli et al., 2014). Tangibility reduces the adverse selection problem and facilitates access to the credit market, thereby mitigating conservative debt behavior. H3d: The greater the ratio of tangible assets in a company, the lower the propensity to be zero leverage.	Creditors exhibit a preference for mature companies with high asset tangibility, as such assets can serve as collateral (Benmelech and Bergman, 2009). In this vein, Gatchev et al. (2009) find that equity is the predominant source of financing when a company suffers financial constraints because of profit shortfalls, intangible assets, and internally generated growth opportunities. H3s: The availability of tangible assets increases the attractiveness of a company to creditors; thus, greater tangibility is associated with a lower propensity to be a zero-debt company.
4. Liquidity	Dang (2013) argues that in the presence of market frictions such as adverse selection (Myers and Majluf, 1984) or transaction costs (Leary and Roberts, 2005), firms eschew debt and favor cash to save their borrowing capacity for future investment opportunities (Gamba and Triantis, 2008). Moreover, DeAngelo and DeAngelo (2007) support the idea that financially flexible firms with substantial liquidity have good reputations in capital markets. This enhanced reputation allows them to use more equity, and consequently, demand less debt (Byoun and Xu, 2013). Similarly, pecking-order theory argues that liquid firms resort less to borrowing, suggesting that companies prefer cheaper internal to expensive external financing (Myers and	

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Zero-debt determinants	Financial flexibility hypotheses (demand side)	Financial constraints hypotheses (supply side)
	Majluf, 1984). H4d: The greater the liquidity of a firm, the lower the need to demand debt and the higher the propensity for zero leverage.	
5. Profitability	Internally generated funds can be seen as a proxy for financial flexibility, which reduces the need for external borrowing (Titman and Wessels, 1988). Indeed, Ghose and Kabra (2016) find that highly profitable and financially unconstrained, zero-debt firms appear to be able to meet their financial obligations. Likewise, Yasmin and Rashid (2019) highlight financial hierarchy and financial flexibility as primary reasons for companies to avoid debt financing. H5d: An increase in a firm's profitability increases its internally generated funds and increases the propensity to be a zero-leverage firm.	Firms with weaker reputation and low profit-generating capacity face higher borrowing costs in credit markets (Diamond, 1991). H5s: More profitable firms have lower probability of becoming zero-leverage firms.
6. Financial reporting quality		Improved reporting enhances visibility and reputation of the company, thereby mitigating information-asymmetry problems between managers and creditors. Supporting this view, Lesmond et al. (2002) document that increases in debt usage are associated with increases in information asymmetry in the remaining equity. H6s: As companies improve their financial reporting quality, debt becomes less relevant for disciplining managers and the propensity to be a zero-leverage firm increases.
7. Ownership structure	Ownership structure plays a key role in shaping the firm's agency problems (Brailsford et al., 2002; Jensen and Meckling, 1976; La Porta et al., 1999). According to Li and Li (2022), improvements in equity-centered governance associated with cross ownership reduce the benefits of and need for debt governance. H7d: More concentrated ownership decreases the demand for debt, increasing the propensity to be a zero-leverage firm.	Firms with a concentrated ownership structure face greater problems of asymmetric information between insiders and outsiders, lesser agency problems between shareholders and managers, and greater adverse selection and moral hazard problems, which necessitate tighter monitoring by lenders (Ben-Nasr et al., 2021). Thus, financial intermediaries and investors may become reluctant to lend to these companies. H7s: A more concentrated ownership structure exacerbates the problems of adverse selection and moral hazard, reducing the supply of debt. Highly concentrated ownership increases the chances of becoming an unleveraged company.
8. Life cycle	Saona et al. (2020) argue that consolidated companies, in their mature stage, tend to resort to debt, whereas young, growing firms observe fewer opportunities for indebtedness. We consider life cycle a demand-side factor because of the problems encountered by young firms, namely, significant information asymmetries and weak reputation (Castro et al., 2016; Lefebvre, 2021). In their initial stages, smaller, younger, and less transparent firms rely more heavily on insider finance (e.g., startup team, founders), trade credit, or angel finance, and therefore are less inclined to turn to debt markets. Having an all-equity capital structure is imperative at early stages of a company's financial-growth life cycle and becomes a choice upon reaching financial maturity (Mac an Bhaird and Lucey, 2011). Hence, different financing sources become important at different points in the life cycle. Debt issuance becomes prominent when the company matures, experiences an increase in assets, and when it becomes more informationally transparent (Berger and Udell, 1998). H8d: Young companies have higher chances of adopting a strategy of zero leverage than mature companies due to their strong information asymmetries and weak reputation.	
9. Financial risk	Companies with higher levels of risk tend to demand more debt, creating a potential debt trap as heavily leveraged companies become increasingly reliant on additional debt. Ferrão et al. (2016) argue that the level of risk is a determinant of both the zero-debt strategy, and the low-leverage policy. More generally, they observe that higher risk, measured as asset volatility, increases the likelihood that a firm will remain unleveraged in the future to sidestep the pitfalls of excessive debt. Similarly, Morais et al. (2020) find that entrenched managers favor less debt to reduce their firm's financial risk, protect their human capital, increase the resources under their control, and avoid the disciplinary	The work of Faulkender and Petersen (2006) indicates that firms with high credit ratings (e.g., typically larger, more visible, and less risky) tend to have higher debt ratios than those with low credit ratings. Tang (2009) shows that changes in a firm's Moody's credit risk score cause changes in its capital structure. Improvements in credit rating are positively associated with increases in long-term debt levels and increases in the debt-to-equity ratio. Thus, riskier firms, as perceived by the debt market, face challenges in securing loans, and when they do, the terms are less favorable compared to low-risk firms. H9s: Creditors in unstable environments are less willing to

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Zero-debt determinants	Financial flexibility hypotheses (demand side)	Financial constraints hypotheses (supply side)
	role of debt. Indeed, it is common for large, liquid, profitable firms in BRICS countries with low expected distress costs to use debt conservatively (Graham, 2000). H9d: Firms closer to financial distress are stuck in a debt trap, while healthy firms in unstable environments favor less debt to cope with the uncertainty.	lend, so financially healthy companies face lower debt supply, forcing them to adopt a low-leverage strategy.
10. Market timing	Baker and Wurgler (2002) argue that companies' capital structure is the outcome of past decisions that are strongly related to historical market values. Their argument centers on firms opting for equity issuance during periods of high market values. Conversely, when market values are low, firms engage in equity repurchases, often accompanied by debt issuance. According to this argument, the existence of zero-debt companies should be explained by a continuous time sequence of high market values prompting firms to opt for equity capital instead of debt (Hovakimian et al., 2001). Additionally, those companies whose investors are too enthusiastic about earnings prospects may choose to exclusively issue equity, resulting in zero-debt firms (Denis and Sarin, 2001). Baker and Stein (2004) argue that the capital structure of a company at a particular point in time is the result of managers balancing three conflicting goals: maximize a firm's fundamental value, maximize the company's share price, and exploit share mispricing for the benefit of shareholders. Zero-debt companies should be the cumulative outcome of the historical attempts to time the market (Baker and Wurgler, 2002). Stein (1996) predicts that investments will be more sensitive to mispricing in equity-dependent firms. In a complementary view, Baker et al. (2003) argue that mispricing is more relevant for financially constrained firms. Then, managers are responsive to recent stock returns (Baker and Xuan, 2016) and they issue less equity when they care about short-run stock prices (Baker and Stein, 2004). Besides, according to Lambrecht and Myers (2017), managers do not take full advantage of the tax shields due to their irrational behavior. H10d: The unleveraged companies are the result of managers' decisions to time the market to benefit shareholders.	
11. Managers' behavior (debt aversion, optimism, overconfidence)	Lambrecht and Myers (2017) recognize that capital structure is contingent on the financial behavior of managers. Managerial biases, particularly those of optimism and overconfidence, contribute to a belief among managers that their firms are undervalued. This belief, in turn, fosters a tendency to over-invest from internal resources, and a preference for equity over debt (Baker and Wurgler, 2013). Those biases coupled with managers' debt aversion further reinforce a company's avoidance of debt financing (Dichev, 2007). Thus, low-leveraged capital structure can be attributed to managerial biases. For instance, managers may limit their use of external financing to periods when the company valuation is high (Hovakimian et al., 2001). Alternatively, they may seek financing when stock prices have recently risen (Graham and Harvey, 2001), choose to raise capital following periods of superior past returns and anticipating poor future returns (Dichev, 2007). Then, when managers are debt-adverse, firms could take advantage of issuing equity when investors are too enthusiastic about earnings prospects (Denis and Sarin, 2001), or managers use windows of opportunity to raise equity when prices are temporarily high (Dichev, 2007). As investor sentiment varies over time, equity issues tend to cluster when the market is overvalued (Baker and Wurgler, 2013). Debt averse managers avoid debt and prioritize dividends' payments to reward shareholders and secure equity financing, resulting in suboptimal borrowing (Meissner, 2016). H11d: The demand of debt depends on the managers aversion to debt and on the bias of optimism and overconfidence	

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Zero-debt determinants	Financial flexibility hypotheses (demand side)	Financial constraints hypotheses (supply side)
12. Institutional quality	Governance, legal, and regulatory systems may determine the demand for corporate borrowing, such as the foundation of the legal system, the general protection of property rights of creditors and shareholders, law enforcement, or transparency and disclosure of financial information (Kaufmann et al., 2011). H12d: As the governance and institutional systems of the firm's country develop, the propensity for zero-debt behavior decreases.	Advances in institutional quality encourage stakeholders-based discipline (Cai et al., 2014), thereby reducing barriers to borrowing (Morais et al., 2022). H12s: A high-quality institutional environment reduces the propensity to become a zero-leveraged firm.
13. Economic freedom		In institutional environments with greater financial freedom, companies exhibit a heightened inclination to finance themselves through debt (Gregory, 2020). Financial freedom serves as an incentive for creditors to supply debt to the corporate sector. Economies with robust financial freedom facilitate connections between firms and financial institutions, which reduces information asymmetries (Leland and Pyle, 1977). In turn, this enables financial institutions to grant more credit to firms and with more favorable terms (Djankov et al., 2007; Takami, 2016). H13s: Improvements in the economic freedom of a country reduce the probability of adopting a zero-leverage strategy.
14. Financial development		The outcomes of financial development include improvements in capital allocation, liquidity, firms' access to more sophisticated financial instruments, information flows, as well as external financing costs (Love, 2011). Lin and Tai (2013) argue that financial development not only reduces agency problems in firms but improves the quality of information produced by analysts, which increases companies' debt capacity while reducing financial restrictions. H14s: The more developed financial markets are, the lower the propensity for zero-debt behavior.

Appendix C. Panel composition

This table describes the panel structure of the sample used in the empirical analysis, identifying the proportion of observations per each country and each year of non-debt (ZL) or low leverage (lower than 5%) over the total number of observations for that year in each country.

Year	Variable	Brazil	Russia	India	China	South Africa	BRICS
2010	ZL	6.82%	1.85%	7.04%	11.61%	9.24%	9.14%
	ZL5	9.09%	3.70%	17.25%	25.89%	23.53%	21.01%
2011	ZL	6.48%	5.19%	6.99%	11.85%	8.04%	9.50%
	ZL5	12.04%	10.39%	17.07%	26.47%	23.21%	21.86%
2012	ZL	5.75%	1.72%	7.44%	11.43%	7.63%	9.46%
	ZL5	11.49%	6.90%	18.11%	27.78%	27.97%	23.32%
2013	ZL	1.09%	3.13%	8.88%	9.69%	4.90%	8.89%
	ZL5	9.78%	7.29%	18.89%	24.54%	20.59%	21.61%
2014	ZL	5.71%	8.14%	9.21%	8.90%	9.65%	8.95%
	ZL5	11.43%	13.95%	20.33%	24.33%	23.68%	22.42%
2015	ZL	1.39%	8.25%	9.51%	8.73%	13.33%	8.94%
	ZL5	8.33%	17.53%	21.38%	23.52%	25.71%	22.46%
2016	ZL	6.15%	7.29%	9.89%	10.53%	13.11%	10.22%
	ZL5	15.38%	12.50%	22.97%	28.09%	24.59%	25.45%
2017	ZL	3.90%	12.79%	7.63%	9.73%	8.49%	8.91%
	ZL5	12.99%	19.77%	21.64%	26.81%	27.36%	24.58%
2018	ZL	3.75%	14.77%	8.63%	7.54%	9.09%	7.98%
	ZL5	12.50%	21.59%	26.54%	24.08%	24.55%	24.48%
2019	ZL	0.00%	8.86%	11.18%	5.50%	8.43%	7.19%
	ZL5	10.26%	17.72%	30.03%	22.23%	20.48%	24.07%
2020	ZL	1.35%	8.24%	5.20%	4.86%	0.00%	4.84%
	ZL5	16.22%	14.12%	26.33%	19.82%	17.72%	21.27%
2021	ZL	2.33%	6.67%	5.43%	1.43%	1.20%	2.85%
	ZL5	11.63%	18.67%	30.81%	17.40%	20.48%	21.56%
	N	977	977	14,190	24,004	1253	41,401
	Companies	173	172	2188	3736	162	6431

Appendix D. Variable definitions

This table describes how the variables used in the empirical analysis are constructed. The dependent variable is *NZL* (or *NZL*5), a dummy that indicates a leveraged (or highly leveraged) company. The company-level variables are the company's size, growth opportunities, asset tangibility, liquidity, profitability, quality of financial transparency, ownership structure, life cycle, and financial default risk. The models also include country-level variables: quality of the institutional system and financial development.

Variables	Concept	Source	Definition
ZL	Zero-debt company	Bae and Chung (2022) and Dang (2013)	Takes value 1 if the company has zero debt on its balance sheet and 0 otherwise
NZL	Leveraged company	Morais et al. (2020)	Takes value 1 if the company has debt on its balance sheet and 0 if it is unleveraged
ZL5	Low-leveraged company	Saona et al. (2020)	Takes value 1 if the firm has a ratio of debt to total assets below or equal to 0.05 and 0 otherwise
NZL5	Highly leveraged company	Saona et al. (2020)	Takes value 1 if the firm has a ratio of debt to total assets above 0.05 and 0 otherwise
Size	Company size	Frank and Goyal (2009)	Log (total assets)
Sizeage		Hadlock and Pierce (2010)	$(-0.737 * Size) + (0.043 * Size^2) - (0.040 * age)$
GO	Growth opportunities	Billett et al. (2007)	Tobin's Q = (market value + total debt) / total assets
Tang	Tangibility	Cantillo and Wright (2000)	Net property plant and equipment / total assets
Liquid	Liquidity		Total cash and equivalent / total assets
ROA	Profitability		Net income / total assets
Transp1	Financial reporting quality	Saona et al. (2023b)	StarMine's earnings quality includes accruals, cash flow, and operating efficiency
Transp2			StarMine's earnings quality based on accruals only
Transp3			StarMine's earnings quality based on cash flow only
Transp4			StarMine's earnings quality based on operating efficiency only
OwnCon	Ownership structure	Brailsford et al. (2002)	Majority shareholder's direct voting rights
OwnClosely		Saona and San Martín (2018)	The proportion of shares held as cross holdings or by government, employees, and insiders
LifeCycle	Company life cycle	Anthony and Ramesh (1992)	(1 + Div) * (1 + SalesGrowth) * (1 + CAPEX)
ZScore	Financial risk	Altman (2005)	6.56 * WK + 3.26 * RE + 6.72 * OI + 1.05 * BE +3.25
CMKV	Market timing	Baker et al. (2003)	Market capitalization in t / Market capitalization in $t-1$
NDTS		Saona and Vallelado (2012)	Depreciation / Total assets
DIV	Managers behavior	Meissner (2016)	Dividends paid / Net income
REG			Retained earnings in t / Retained earnings in $t-1$
SG			Total revenue in t / Total revenue in $t-1$
WGI	Institutional quality	Kaufmann et al. (2011)	It includes measures of rule of law, regulatory quality, voice and accountability, government effectiveness, political stability, and control of corruption in the country
EconFree	Financial development	Zhang (2016)	Economic Freedom Index incorporates financial, business, trade, and investment freedom, which are equally weighted
SMTVT		Beck et al. (2000)	The total value of all traded shares in the stock exchange of each country as a percentage of GDP

Appendix E. Mean-difference test between levered and unlevered companies for each BRICS country

The table is separated into 5 panels and provides descriptive statistics of the variables used in the empirical analyses. Each panel provides the mean, standard deviation, and minimum and maximum values of the variables described in Appendix C in a panel-based structure.

Panel A. Brazil

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0379	0.1910	0.0000	1.0000
ZL5	0.1167	0.3212	0.0000	1.0000
NZL	0.9621	0.1910	0.0000	1.0000
NZL5	0.8833	0.3212	0.0000	1.0000
Size	20.829	1.7239	15.3011	26.2402
Sizeage	1.5033	2.2571	−3.8728	7.9373
Tang	0.2726	0.2152	0.0002	0.9036
GO	−0.0436	0.6474	−2.3319	1.8969

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Variable	Mean	Std. Dev.	Min	Max
Liquid	2.0393	1.8623	0.1941	21.1539
ROA	0.0606	0.0595	−0.3109	0.2837
Transp1	0.5241	0.2728	0.0100	1.0000
Transp2	0.5663	0.1945	0.0400	0.9875
Transp3	0.4859	0.2434	0.0100	1.0000
Transp4	0.6109	0.2443	0.0200	1.0000
OwnCon	0.2665	0.2048	0.0000	0.9990
OwnClosely	0.3486	0.2492	0.0000	0.9959
LifeCycle	1.4973	0.4637	0.0873	3.2687
Zscore	6.7613	2.8176	−3.6846	28.5828
CMKV	1.1340	0.5919	0.2367	5.1028
NDTS	0.0105	0.0136	0.0000	0.0875
DIV	0.3540	0.2566	0.0000	0.9982
SG	0.0495	0.2591	−0.9341	0.9500
WGI	−0.0872	0.1472	−0.2659	0.1387
EconFree	0.5511	0.0218	0.5140	0.5790
SMTVT	0.3393	0.0561	0.2460	0.4149

Panel B. China

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0846	0.2784	0.0000	1.0000
ZL5	0.2430	0.4289	0.0000	1.0000
NZL	0.9153	0.2784	0.0000	1.0000
NZL5	0.7570	0.4289	0.0000	1.0000
Size	20.082	1.4022	14.7494	26.5818
Sizeage	1.9173	1.4491	−4.9960	10.1414
Tang	0.2723	0.1884	0.0000	0.9941
GO	0.5401	0.7265	−2.4675	3.0176
Liquid	2.5762	2.8986	0.0367	21.1538
ROA	0.0418	0.0664	−0.3363	0.2837
Transp1	0.3889	0.2997	0.0100	1.0000
Transp2	0.4661	0.2185	0.0150	0.9975
Transp3	0.4541	0.2920	0.0100	1.0000
Transp4	0.4861	0.2736	0.0100	1.0000
OwnCon	0.3097	0.2006	0.0000	1.0000
OwnClosely	0.1950	0.2296	0.0000	1.0000
LifeCycle	1.4801	0.4406	0.0000	3.9475
Zscore	8.1593	5.1678	−6.6499	51.5207
CMKV	1.1890	0.6401	0.2367	5.1029
NDTS	0.0064	0.0068	0.0000	0.0999
DIV	0.2454	0.2225	0.0000	0.9999
SG	0.1437	0.2703	−1.0000	0.9999
WGI	−0.4252	0.1182	−0.6041	−0.2503
EconFree	0.5473	0.0319	0.5100	0.5950
SMTVT	1.5056	0.5684	0.6701	2.4917

Panel C. India

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0815	0.2737	0.0000	1.0000
ZL5	0.2198	0.4141	0.0000	1.0000
NZL	0.9185	0.2737	0.0000	1.0000
NZL5	0.7802	0.4141	0.0000	1.0000
Size	18.2000	1.8712	11.5959	25.7604
Sizeage	−0.4545	1.6756	−5.7566	7.6021
Tang	0.3410	0.2060	0.0000	0.9839
GO	0.0924	0.8385	−2.4677	3.0176
Liquid	2.2142	2.6376	0.0079	21.1539
ROA	0.0536	0.0713	−0.3363	0.2837
Transp1	0.4782	0.3058	0.0100	1.0000
Transp2	0.5320	0.2212	0.0125	0.9975
Transp3	0.4865	0.2682	0.0100	1.0000

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Variable	Mean	Std. Dev.	Min	Max
Transp4	0.5468	0.2786	0.0100	1.0000
OwnCon	0.3351	0.2046	0.0001	1.0000
OwnClosely	0.5715	0.2164	0.0000	0.9976
LifeCycle	1.3202	0.3968	0.0000	3.6427
Zscore	8.2042	5.2753	−7.2049	52.469
CMKV	1.2644	0.8214	0.2367	5.1029
NDTS	0.0295	0.0183	0.0000	0.0996
DIV	0.1622	0.1797	0.0000	0.9982
SG	0.0692	0.2731	−1.0000	0.9991
WGI	−0.2247	0.0898	−0.3512	−0.1114
EconFree	0.5489	0.0111	0.5260	0.5650
SMTVT	0.4534	0.1422	0.2988	0.6594

Panel D. Russia

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0757	0.2647	0.0000	1.0000
ZL5	0.1412	0.3485	0.0000	1.0000
NZL	0.9243	0.2647	0.0000	1.0000
NZL5	0.8587	0.3485	0.0000	1.0000
Size	20.531	2.2257	14.5412	26.4888
Sizeage	2.6858	2.3236	−2.1967	10.1197
Tang	0.4522	0.2501	0.0013	0.9232
GO	−0.4045	0.6062	−2.4676	1.8054
Liquid	1.8031	2.3221	0.1798	21.1539
ROA	0.0506	0.0901	−0.3363	0.2837
Transp1	0.4592	0.2900	0.0100	1.0000
Transp2	0.5191	0.2078	0.0525	0.9925
Transp3	0.5000	0.2655	0.0100	1.0000
Transp4	0.5482	0.2625	0.0100	1.0000
OwnCon	0.5500	0.2428	0.0009	1.0000
OwnClosely	0.7118	0.2279	0.0000	0.9987
LifeCycle	1.4037	0.5011	0.0138	3.4656
Zscore	6.9803	4.7412	−2.1157	48.8371
CMKV	1.1376	0.6741	0.2367	5.1029
NDTS	0.0294	0.0286	0.0000	0.0982
DIV	0.2028	0.2678	0.0000	0.9999
SG	0.0495	0.2905	−0.9863	0.9939
WGI	−0.7142	0.0533	−0.7875	−0.6048
EconFree	0.5455	0.0422	0.5030	0.6150
SMTVT	0.2108	0.1213	0.0818	0.4758

Panel E. South Africa

Variable	Mean	Std. Dev.	Min	Max
ZL	0.0814	0.2736	0.0000	1.0000
ZL5	0.2362	0.4249	0.0000	1.0000
NZL	0.9186	0.2736	0.0000	1.0000
NZL5	0.7638	0.4249	0.0000	1.0000
Size	19.648	1.9572	13.0166	24.5494
Sizeage	0.6161	1.8374	−3.9266	6.4365
Tang	0.3010	0.2169	0.0012	0.8954
GO	−0.0370	0.7550	−2.4676	3.0176
Liquid	2.0124	1.6644	0.2394	21.1539
ROA	0.0671	0.0857	−0.3363	0.2837
Transp1	0.5363	0.2891	0.0100	1.0000
Transp2	0.5707	0.2064	0.0275	0.9900
Transp3	0.4883	0.2559	0.0100	1.0000
Transp4	0.5820	0.2595	0.0100	1.0000
OwnCon	0.2806	0.1734	0.0002	0.8543
OwnClosely	0.3601	0.2832	0.0000	0.9824
LifeCycle	1.4721	0.4189	0.0000	3.6327
Zscore	7.5820	3.3625	−2.8901	48.858

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Variable	Mean	Std. Dev.	Min	Max
CMKV	1.1244	0.5805	0.2367	5.1029
NDTS	0.0299	0.0222	0.0000	0.0993
DIV	0.3370	0.2708	0.0000	0.9988
SG	0.0457	0.2286	−1.0000	0.9815
WGI	0.1332	0.0707	0.0240	0.2335
EconFree	0.6179	0.0147	0.5830	0.6300
SMTVT	0.8884	0.2833	0.5397	1.2575

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