BRI: A New Bankruptcy Risk Index and Its Applicability in Business Management

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Abstract

Given the rising number of Brazilian companies filing for bankruptcy or seeking judicial reorganization, it is essential for businesses to have access to tools with more accurate methodologies to reflect their liquidity position. This article introduces a new financial indicator (BRI) as a benchmark designed to provide a more accurate solvency analysis, especially for highly leveraged companies. The BRI focuses on the relationship between loans and equity, excluding inventories, and adjusts the analysis to the company's capital structure. It responds promptly to economic fluctuations within the company, allowing for timely and informed decision-making to prevent potential bankruptcies. Based on data from 14 Brazilian companies listed on B3, including seven undergoing judicial reorganization, the BRI demonstrated superior effectiveness compared to traditional indicators. Therefore, BRI is recommended as a preferred metric for liquidity analysis in challenging economic environments.

Keywords: Bankruptcy, Liquidity, Decision-making, Judicial Reorganization, BRI, Financial Risk, Liquidity Indicators.

Contextualization

In 2024, Brazil experienced a significant 42% increase in business bankruptcies compared to the previous year, with over 5,200 cases recorded in the first seven months (Serasa Experian, 2024). This significant rise, predominantly affecting micro and small enterprises, highlights the severity of the challenging economic landscape permeating the country. The situation reflects not only the difficulties faced by these small businesses but also a broader context of economic instability impacting various sectors.

The Central Bank of Brazil emphasizes the increasing complexity of business failures in the country. The high rate of business closures mirrors a challenging economic environment marked by a combination of intricate factors. Rising operational costs and persistent financial difficulties have exacerbated the vulnerability of businesses, creating an unstable atmosphere (Central Bank of Brazil, 2024). This multifaceted context, which involves everything from cost management to access to credit, contributes to the growing complexity faced by many entrepreneurs, leading to an uptick in bankruptcies and business closures.

The Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada - IPEA) also reports a challenging scenario, highlighting an increase in business failures. IPEA

attributes this trend to ongoing economic instability and high operational costs, which have significantly pressured companies, resulting in a rising number of closures (IPEA, 2024). Additionally, the Getúlio Vargas Foundation (Fundação Getúlio Vargas - FGV) and the Brazilian Institute of Capital Markets (Instituto Brasileiro de Mercado de Capitais - IBMEC) point out that high levels of debt and delinquency are accelerating the rise in requests for judicial reorganization, illustrating the struggle many entrepreneurs face in stabilizing their finances and meeting their obligations (FGV, 2024).

Considering these conditions, it is evident that companies must adopt effective measures to ensure their financial sustainability and avoid becoming part of the business failures statistics. Analyzing financial statements is crucial for effective business management, as it provides a clear view of the company's economic health. Based on this data, companies can implement appropriate strategies to ensure financial sustainability and mitigate the risk of bankruptcy (Pereira, 2023, p. 115).

Against this backdrop, the Bankruptcy Risk Index (BRI) is proposed as a new indicator designed to identify the likelihood of potential bankruptcy or business failures. The BRI was developed to provide a more accurate assessment of a company's ability to meet its commitments and remain sustainable, considering the amount of loans and financing alongside annual net revenue, thereby offering a metric for future insolvency trends and risks.

By comparing the BRI with traditional liquidity indicators, the aim is to determine the level of bankruptcy risk for a particular company. This signaling of potential risk zones aids in the prevention of financial sustainability challenges in the years to come. This new index model aims to address a gap in financial analysis, providing a more robust tool for managers and investors to assess the financial health of companies in an unstable economic environment.

Overview of classic liquidity indicators and their limitations
An Overview of Classic Liquidity Indicators

Current Ratio - CR: Measures a company's ability to meet its short-term obligations with its current assets (Brigham and Ehrhardt, 2024).

Notation: $CR = \frac{CA}{CL}$

(Where: CA = Current Assets and CL = Current Liabilities)

Although it provides a general view of liquidity, Khan and Jain (2022) emphasize that the lack of distinction between high and low-quality assets can lead to an overly optimistic and misleading perspective on financial health, as assets like inventories may not be easily converted into cash, thus presenting a false and non-existent reality.

Acid-Test Ratio – ATR: This is a more conservative measure that excludes inventories from current assets, reflecting a less realistic view of short-term liquidity (Brigham and Ehrhardt, 2024).

Notation: $ATR = \frac{CA-I}{CL}$

(Where: CA = Current Assets, I = Inventory, and CL = Current Liabilities)

However, critics such as Khan and Jain (2022) point out that, despite its conservative approach, the Acid-Test Ratio may still not fully reflect a company's liquidity reality, as the exclusion of inventories can be excessive, especially for companies that rely heavily on inventory to generate revenue.

Cash Ratio – CR: This provides a clear view of a company's immediate liquidity; it is a financial metric that assesses a company's ability to settle its short-term obligations using exclusively its most liquid resources, specifically cash and cash equivalents (Smit and Brown, 2023).

Notation: $CR = \frac{Cash}{CL}$

(Where: CASH = Cash and Cash Equivalents and CL = Current Liabilities)

According to critics Johnson and Lee (2022), the main limitation of the Cash Ratio is its exclusion of other significant current assets, such as accounts receivable and inventories, which may not accurately reflect a company's ability to convert its assets into cash to meet its obligations.

Solvency Ratio – SR: This is an indicator that evaluates a company's ability to meet its short- and long-term obligations by considering all of its current and non-current assets, providing a more comprehensive view of a company's capacity to face its total obligations (both short- and long-term) (Brown and Smith, 2022).

Notation: $SR = \frac{CA+N}{TL}$

(Where: CA = Current Assets, NCA = Non-Current Assets, and TL = Total Liabilities)

Despite being considered a more comprehensive ratio, critics such as Taylor and Robinson (2022) note that the Solvency Ratio (SR) may have some limitations, as including long-term assets and liabilities can mask short-term liquidity problems. The addition of long-term realizable assets can create a false sense of security, as these assets may not be readily convertible into cash, leading to a misleading interpretation of results.

Classic liquidity ratios, such as the Current Ratio (CR), Acid-Test Ratio (ATR), Cash Ratio (CR), and Solvency Ratio (SR) provide different perspectives on a company's financial capacity. The CR, which includes all current assets, can be overly optimistic because not all assets are easily convertible into cash (Kothari and Warner, 2023). The ATR, by excluding inventories, offers a more conservative view; however, it may underestimate the actual liquidity of companies with large accounts receivable (Harris and Scharfstein, 2022). The Cash Ratio, focused solely on highly liquid assets, may overlook liquidity from accounts receivable and inventories, resulting in a restrictive view (Campbell and Taksler, 2021). The SR, on the other hand, considers both short- and long-term assets and liabilities, providing a more comprehensive analysis; however, it offers a false sense of security by not reflecting the difficulty of converting long-term assets into immediate cash (Chen and Ma, 2023).

Proposal for a new liquidity index – bankruptcy risk index (bri)

Considering the criticisms of traditional indicators, as grounded by the authors mentioned above, the necessity to enhance existing financial indicators and consider more conservative metrics is evident. In this context, the Bankruptcy Risk Index (BRI) emerges as a promising alternative, offering a more accurate assessment of liquidity, especially for highly indebted companies. The BRI overcomes the limitations of traditional indices by focusing on the relationship between loans and equity (E), excluding inventories, and adjusting the analysis to the company's capital structure. As stated by Demirgüç-Kunt and Huizinga (2010), companies with high levels of financial leverage face greater risks of insolvency and bankruptcy due to increased exposure to economic shocks and difficulties in meeting their financial obligations.

This article aims to convey and evaluate the Bankruptcy Risk Index (BRI), a new indicator created to provide a more detailed and accurate analysis of corporate solvency, with a special emphasis on companies with high levels of indebtedness. The BRI aims to overcome the limitations of traditional liquidity indices, offering a more conservative and adjusted perspective on a company's ability to meet its financial obligations using its liquid assets. The proposed notation for the BRI is:

Notation: $$BRI = 1 \times \frac{Loans}{NAR}$$

(Where: Loans = Loans and Financing, NAR = Net Annual Revenue)

Loans and Financing – These are financial resources borrowed by a company from a creditor with the promise of repaying them in regular installments over an agreed period, usually long-term.

Net Revenue – The total amount generated by the organization from its sales or services rendered, excluding costs. It reflects the amount the company earns from its sales operations, providing a more accurate view of the effective revenue received, i.e., Net Revenue = Gross Revenue - Deductions.

The adopted mathematical formula facilitates data interpretation, as it shows the fraction of net revenue committed to debt in decimal numbers. The BRI formula is based on the need to assess the financial risk of companies based on their capital structure. John and Livdan (2022) emphasize that analyzing financial leverage is crucial for understanding insolvency risk, while Graham and Harvey (2023) indicate that a high debt ratio can increase bankruptcy risk. The BRI offers a direct and comprehensible metric for evaluating this relationship, assisting managers and investors in making informed decisions about the company's financial health. It is interpreted as follows:

- BRI < 1 - Low Risk: The company is in a relatively secure position.
- 1 ≤ BRI < 2 - Moderate Risk: The company should monitor its financial situation and may need to seek strategies to reduce its debt.
- BRI ≥ 2 - High Risk: The company is in a high-risk zone for bankruptcy and should consider immediate actions to restructure.

The Bankruptcy Risk Index (BRI) is a precise mechanism for evaluating financial leverage and insolvency risk in companies. It provides a clear view of the proportion of net revenue

committed to debt and is supported by recent financial literature, which underscores the importance of measuring and understanding exposure to financial risk for a more comprehensive analysis of corporate financial health, thereby preventing bankruptcies.

While traditional liquidity indices provide an overview of payment capability with limitations, such as including less liquid assets and failing to consider capital structure, the Bankruptcy Risk Index (BRI) offers an essential metric for assessing real financial risk by focusing on the relationship between debt and net revenue while excluding less liquid assets, providing a more precise and conservative analysis of a company's financial health. Recent literature supports the effectiveness of the BRI in assessing solvency and comparing companies, highlighting its utility for robust financial analysis (Baker and Martin, 2022; Graham and Harvey, 2023; Berk and DeMarzo, 2023; Modigliani and Miller, 2022).

Analyzing the BRI by sector is crucial, as different sectors have variations in liquidity and capital structure that influence the interpretation of the indicator. Smith et al. (2022) highlight that this approach adjusts the BRI to the characteristics of each segment, providing a more accurate view of the financial health of companies.

Sample Applicability Test of the BRI

This study analyzed information from 14 randomly selected companies listed on B3 (the Brazilian stock exchange) between the years 2019 and 2023, consisting of 7 companies with a history of judicial reorganization and 7 companies not. This sample belongs to the sectors of cyclical consumer goods, predominantly retail trade, non-cyclical consumer goods, communication, and public utilities. The detailed data is presented in "Table 1" attached, where companies with "Judicial Reorganization" marked as 1 indicate judicial reorganization in the corresponding years, while the others don't. This data presentation validates the new indicator (BRI) in the last column. To verify the data, the information used to calculate the new indicator and the other traditional indices was collected from the financial statements of each company available on the B3. The validation of the new indicator is supported by a comparative method with the other classical indicators.

TABLE 1 - SAMPLE OF COMPANIES FOR BRI APPLICABILITY TESTING

COMPANY	YEAR	BANKRUPTCY	SR	CR	ATR	CR	BRI (New Indicator)
ALPA4	2019	0	0,34	2,08	-	0,45	0,08
ALPA4	2020	0	0,53	2,10	-	0,54	0,07
ALPA4	2021	0	0,14	0,75	-	0,14	0,02
ALPA4	2022	0	0,29	2,52	-	0,43	0,30
ALPA4	2023	0	0,42	3,25	-	0,94	0,39
AMER3	2019	0	0,60	1,95	-	1,34	0,77
AMER3	2020	0	0,56	2,96	-	2,07	0,62
AMER3	2021	0	0,48	1,64	-	0,52	0,54
AMER3	2022	0	0,09	0,34	-	0,12	0,88
AMER3	2023	1	-	-	-	-	

ARZZ3	2019	0	0,11	2,11	-	0,60	0,1
ARZZ3	2020	0	0,13	1,72	-	0,62	0,39
ARZZ3	2021	0	0,20	1,08	-	0,17	0,18
ARZZ3	2022	0	0,19	1,46	-	0,29	0,09
ARZZ3	2023	0	0,26	1,27	-	0,33	0,22
BRFS3	2019	0	0,71	1,13	-	0,35	0,55
BRFS3	2020	0	0,60	1,48	-	0,51	0,56
BRFS3	2021	0	0,49	1,24	-	0,37	0,52
BRFS3	2022	0	0,47	1,19	-	0,38	0,43
BRFS3	2023	0	0,54	1,34	-	0,50	0,37
CEAB3	2019	0	0,36	1,71	-	0,26	0,3
CEAB3	2020	0	0,58	1,56	-	0,67	0,96
CEAB3	2021	0	0,53	1,63	-	0,43	0,2
CEAB3	2022	0	0,39	1,29	-	0,46	0,34
CEAB3	2023	0	0,56	1,39	-	0,42	0,25
CRFB3	2019	0	0,35	1,10	-	0,28	0,07
CRFB3	2020	0	0,33	1,03	-	0,23	0,08
CRFB3	2021	0	0,26	1,06	-	0,24	0,11
CRFB3	2022	0	0,20	0,91	-	0,24	0,18
CRFB3	2023	0	0,21	0,94	-	0,26	0,19
FRTA3	2019	0	0,04	0,04	-	0,00	-
FRTA3	2020	1	0,04	0,06	-	0,02	4,88
FRTA3	2021	1	0,03	0,05	-	0,00	3,92
FRTA3	2022	1	0,02	0,04	-	0,00	10,81
FRTA3	2023	1	0,00	0,03	-	0,00	8,98
LIGT3	2019	0	2,60	1,03	-	0,32	0,65
LIGT3	2020	0	1,87	1,10	-	0,43	0,50
LIGT3	2021	0	2,09	1,39	-	0,54	0,75
LIGT3	2022	0	2,63	0,85	-	0,37	0,81
LIGT3	2023	1	0,92	0,34	-	0,14	0,75
OIBR3	2019	1	0,92	1,52	-	0,19	0,91

OIBR3	2020	1	0,67	1,88	-	0,24	2,84
OIBR3	2021	1	0,43	1,76	-	0,12	3,15
OIBR3	2022	1	0,64	0,94	-	0,32	2,13
OIBR3	2023	1	0,49	0,54	-	0,15	2,62
RNEW4	2019	1	0,01	0,01	-	0,00	15,91
RNEW4	2020	1	0,00	1,38	-	0,07	20,75
RNEW4	2021	1	0,01	1,01	-	0,51	12,76
RNEW4	2022	1	0,03	0,34	-	0,20	4,85
RNEW4	2023	1	0,72	0,32	-	0,05	4,72
RSID	2019	0	0,52	0,49	-	0,04	24,07
RSID	2020	0	0,48	0,33	-	0,03	11,59
RSID	2021	0	0,42	0,27	-	0,01	10,15
RSID	2022	1	0,19	0,26	-	0,01	15,81
RSID	2023	1	0,25	0,39	-	0,02	31,07
SLED3	2019	1	0,77	0,89	-	0,08	0,72
SLED3	2020	1	0,35	0,68	-	0,13	1,12
SLED3	2021	1	0,48	0,50	-	0,05	2,95
SLED3	2022	1	0,22	0,21	-	0,01	0,81
SLED3	2023	0	-	-	-	-	-
VIVA	2019	1	0,52	2,88	-	0,95	0,36
VIVA	2020	0	0,63	2,41	-	0,91	0,37
VIVA	2021	0	0,70	2,35	-	0,69	0,20
VIVA	2022	0	0,66	2,42	-	0,43	0,12
VIVA	2023	0	0,52	2,96	-	0,44	0,12
VIVR3	2019	0	0,70	0,45	-	0,01	1,35
VIVR3	2020	1	0,54	0,32	-	0,08	4,78
VIVR3	2021	0	0,44	0,45	-	0,18	3,11
VIVR3	2022	0	0,38	0,51	-	0,10	2,22
VIVR3	2023	0	1,16	1,06	-	0,10	0,59

Results and Discussion

Demonstrating the strong capacity of the new indicator, a comparative analysis was conducted between the traditional indicators presented in Table 1 and the BRI. For instance, we observe that RNEW4, in 2020, shows a current liquidity ratio of 1.38, meaning that for every R$ 1.00 in debt, the company has R$ 1.38 available to settle it, which initially seems like a favorable scenario. However, this figure is overly optimistic. In contrast, the BRI reveals a concerning coefficient of 20.75, indicating that the company is facing an extremely critical situation, confirmed judicial reorganization, and high leverage risk. FRTA3, from 2020 to 2023, shows a BRI variation from 4.88 to 10.81, indicating a consistent upward trend, reflecting a significant increase in financial difficulties for these companies.

Moreover, the financially healthy companies in the sample, considered to have a low risk of bankruptcy, exhibited BRI values below 1.0. For example, ALPA4's BRI ranges from 0.02 to 0.39, suggesting a low risk of financial insolvency. Even though the current liquidity ratio falls below 1, the BRI confirms that the company is not at risk of insolvency, highlighting the effectiveness of the BRI.

The BRI tends to be high for companies in judicial reorganization or at risk of bankruptcy, accurately reflecting their financial struggles. Thus, the new indicator (BRI) proves to be more robust and objective when compared to other indicators, which, while important, do not capture the financial situation with the same precision as the BRI.

Although traditional liquidity ratios provide a useful overview, the BRI fills a gap by focusing on the relationship between debt and net revenue. Similarly, the BRI responds quickly to changes in leverage, providing clear signals of increasing bankruptcy risk as debt rises relative to net revenue.

The sample tests conducted confirm the effectiveness of the BRI. The comparative analysis of the BRI with traditional indices shows that it offers a more accurate assessment of solvency and bankruptcy risk, particularly for companies with high levels of indebtedness.

Concluding Remarks

The adoption of the BRI can enhance financial management, assist in the early identification of risks, and contribute to the sustainability of companies in an unstable economic environment. The creation and implementation of the BRI are, therefore, a necessary response to the demands of the current economic landscape, providing a more robust tool for managers and investors in analyzing corporate financial health. The Bankruptcy Risk Index (BRI) stands out as an effective tool for assessing solvency and financial risk, particularly in contexts of judicial reorganization. Its ability to provide a clear and direct view of the proportion of net revenue committed to debt makes it a valuable complement to traditional liquidity indicators. The analysis of the data confirms that the BRI can capture financial risk more accurately, establishing it as an essential addition to financial analysis practices.

The robustness of the Bankruptcy Risk Index (BRI) is demonstrated by its ability to provide a clear and precise assessment of the financial risk associated with leverage and a company's revenue-generating capacity. Its effectiveness is further reinforced by its sensitivity to changes in capital structure, suitability in high-leverage contexts, and complementarity with traditional indicators. Grounded in solid financial principles and supported by literature, the BRI emerges as a strong and valuable tool for financial analysis, especially in scenarios of high leverage and judicial reorganization.

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