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Financial risk rating in the automotive industry: A quantitative interval-based approach

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ABSTRACT

This study explores the role of rating in the financial risk management process within automobile manufacturing organizations. It examines the methodological approaches employed by automakers to evaluate financial risks, with a particular focus on liquidity, solvency, financial stability, business activity, and market risks. Building on existing techniques, the research introduces an interval-based risk assessment methodology that differentiates industry sectors and applies it to 22 leading automakers listed on international stock exchanges by capitalization. The study seeks to identify high-risk zones across the sector in relation to key components of financial condition, offering decision-makers a comprehensive view of industry-wide vulnerabilities. The scientific novelty lies in adopting a rating-based approach that integrates a detailed assessment of financial risks across the automotive industry, moving beyond traditional company-specific analyses. While operational risks are often addressed in terms of supply chain disruptions or production delays, this study emphasizes their financial consequences. Production stoppages, inefficiencies, safety incidents, and unexpected shocks such as natural disasters, labor strikes, or equipment breakdowns can significantly raise costs and erode revenues. By examining these interconnections, the study highlights the importance of contingency planning and supply chain diversification as tools for mitigating the financial effects of operational disruptions. Overall, the research provides a holistic framework for assessing financial and operational risks, offering valuable insights for investors, managers, and policymakers seeking to strengthen risk management practices in the automotive sector.

Contribution/ Originality: This study contributes to financial risk management research by developing a rating-based methodology for assessing liquidity, solvency, stability, business activity, and market risks in the automotive industry. Using data from 22 global automakers, it identifies sector-wide vulnerabilities, integrating financial and operational risk factors to improve decision-making and resilience strategies.

1. INTRODUCTION

The automotive manufacturing industry is among the most dynamic and complex sectors of the global economy. Characterized by vast supply chains, rapidly evolving technologies, regulatory pressures, and shifting consumer preferences, the industry faces a wide range of risks that can significantly affect business performance, financial stability, and market positioning. Effective risk management is therefore essential for manufacturers to address these challenges and maintain long-term competitiveness (Vonderlin et al., 2023).

In automobile production, risk management entails identifying, assessing, and mitigating risks that may threaten organizational objectives, operations, and financial health. These risks stem from operational disruptions, market and geopolitical volatility, environmental concerns, and technological or regulatory changes (Gupta, 2017). As automakers increasingly integrate innovations such as electric vehicles (EVs), autonomous driving systems, and smart manufacturing technologies, the scope of risks expands, necessitating more adaptive and sophisticated management approaches (Surange & Bokade, 2024).

The risk management process typically involves several key stages. Risk identification is conducted through methods such as SWOT analysis, risk workshops, and scenario planning (Lehnert, 2022). Identified risks are then evaluated by likelihood and impact, often using risk matrices (Vijaya, Meisterknecht, Angreani, & Wicaksono, 2025). Mitigation strategies include diversifying supply chains to reduce single-source dependencies (Tziakou, Fragkaki, & Platis, 2023) and investing in automation, predictive maintenance, and real-time monitoring (Murtaza et al., 2024). Financial hedging through instruments such as futures contracts and insurance is also widely applied (Ionescu, Dumitrescu, Ioanăş, & Delcea, 2024). Furthermore, compliance measures such as regulatory monitoring, audits, and rigorous product testing remain fundamental to risk management (La Gatta, Postiglione, & Sperlì, 2025). Continuous monitoring of Key Risk Indicators (KRIs) and systematic reporting help assess the effectiveness of these strategies (Ivanov, 2024) while comprehensive crisis management plans ensure swift responses to disruptions or recalls (Emrouznejad, Abbasi, & Sıcakyüz, 2023).

In this context, sustaining financial stability in automobile manufacturing requires a combination of traditional practices and innovative methodological solutions for risk assessment and rating. This underscores both the relevance and the theoretical-practical significance of the present study.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Financial ratings are critically important for assessing the creditworthiness of automobile manufacturing organizations and determining the effectiveness of financial management. Factor-based approaches, often utilizing financial derivatives, are commonly applied. Arhinful and Radmehr (2023) found that Japanese automobile, construction, electronics, metals, and telecommunications companies rely primarily on debt financing, with equity playing a minor role. Interest rates and cash flows positively affected ROA, ROE, and Tobin's Q.

In factor-based rating approaches, each factor is assessed using a predefined scale, where higher scores indicate lower risk (Osei, Cherkasova, & Oware, 2023). Total assessment is essential, sometimes contrasting with factor analysis as a competitive method (Murtaza et al., 2024). Based on rating assessments, risk zones are differentiated (Crocker & Snow, 2000). Credit rating models are widely applied in finance and banking to evaluate credit, market, and operational risks (McNeish & Wolf, 2020; Ramos, Marques, Faias, & Santos, 2025). Factor-based models are also important in portfolio management (Long, Jiang, Dimitrov, & Wang, 2022).

Within this research, a new methodological approach to credit rating is proposed, specifically addressing the characteristics of financial risks in the automobile manufacturing sector.

3. RESEARCH METHODOLOGY

We choose indicators assessing the structure of the balance sheet, profitability indicators, financial stability ratios, solvency ratios, business activity indicators, and components of financial condition.

First step. Each of them includes the following variables:

1. Indicators assessing the structure of the balance sheet (IACB)

- Total Current Assets / Total Current Liabilities, (K_1).
- Total Current Assets - Total Current Liabilities) / Total Current Assets, (K_2).
- Total Current Assets - Total Current Liabilities) / Shareholder Equity, (K_3).

2. Profitability indicators (Pi)

- Net Income / Total Assets, (K_4).
- Net Income / Shareholder Equity, (K_5).
- EBIT/ Revenue, (K_6).
- Net Income / Cost of Goods Sold, (K_7).

3. Financial stability ratios (FSR)

- Shareholder Equity / Total Assets, (K_8).
- Total Liabilities / Total Assets, (K_9).
- Receivables/Total Current Liabilities, (K_{10}).

4. Solvency ratios (SR)

- Cash on Hand / Total Current Liabilities, (K_{11}).
- (Cash on Hand + Receivables) / Total Current Liabilities, K_{12}.
- Inventory / Total Current Liabilities, (K_{13}).

5. Business activity indicators (BAI)

- Revenue /Total Assets, (K_{14}).
- Revenue /Inventory, (K_{15}).
- Revenue /Share Holder Equity, (K_{16}).

These selected indicators are used to calculate the actual values of the variables included in the components characterizing the financial position based on the financial statements of the leading companies in the automotive industry by capitalization (Auto Manufacturers - Foreign and Auto Manufacturers - Domestic).

Second step: We determine the ranges of the components characterizing the financial condition for the automotive manufacturing industry according to the Risk zone, Danger zone, and Stability zone. The differentiation of the ranges is performed based on the aggregated data of the studied organizations of Auto Manufacturers - Foreign and Auto Manufacturers - Domestic.

Third step: For each indicator included in the components of the financial condition, a score is calculated based on the risk zones, depending on the level of risk. According to the proposed approach, the rating is assigned as follows:

- Risk zone - 1 unit.
- Danger zone -3 unit.
- Stability zone - 5 unit.

In the subsequent sub-step, the average score for each group of indicators is determined, and based on this, the organization's financial risk assessment is provided according to the criteria of that specific group. The risk zone of the specific criterion is then differentiated as follows:

1. Risk zone - Average (Ki) = 1.
2. Danger zone – 1 < Average (Ki) ≤ 3.
3. Stability zone – 3< Average (Ki) ≤ 5.

In the fourth step, based on the integral assessments (ratings) of all criteria, the financial risk zones for automobile manufacturing companies are determined. The rating scores obtained for the studied organizations are compared, and on this basis, specific recommendations are presented.

The COVID-19 pandemic created several unprecedented challenges for automobile manufacturers. Although some of these issues have been gradually resolved, their impact continues to be felt across the industry. The automotive sector depends heavily on global supply chains for components and materials, and the pandemic caused factory shutdowns, labor shortages, and severe logistics delays. One of the most critical disruptions was the global shortage of semiconductors, which substantially reduced vehicle production. Shortages of essential materials such as steel and plastics also resulted in production delays and higher costs (Kušar, Rihar, Žargi, & Starbek, 2013).

To mitigate health risks, automobile manufacturers implemented strict protocols, including the use of personal protective equipment (PPE), sanitation measures, and social distancing, which reduced operational efficiency. Employee absenteeism increased due to health-related issues. Research suggests that mindfulness-based programs (MBPs) for supervisors can reduce unscheduled sick days (Vonderlin et al., 2023). At the beginning of the pandemic, vehicle demand dropped sharply amid economic uncertainty; however, demand later rebounded in certain markets, often shifting toward SUVs and electric vehicles (EVs), as consumers increasingly preferred private over public transportation (Osei et al., 2023). Consumer preferences also evolved, with growing interest in non-toxic materials, advanced safety features, and a notable increase in online vehicle purchases through e-commerce platforms (Suganya, Joseph, & Kollem, 2024).

In response, many manufacturers accelerated their transition to electric vehicles (EVs) while maintaining investments in internal combustion engine (ICE) vehicles. Consumer reliance on external digital information sources, such as smartphone applications and social media, further highlighted behavioral changes during travel (Alkhalisi, 2020).

Remote work requirements accelerated the adoption of digital tools and virtual collaboration platforms, creating challenges in meeting design, engineering, and production timelines (Kibria, Masuk, Safayet, Nguyen, & Mourshed, 2023). Moreover, showroom closures hastened the digitization of sales and after-sales services, including online vehicle sales, virtual consultations, and digital financing options.

The financial condition of automobile manufacturers remains a key determinant of both market risk and performance.

Factor-based financial assessment approaches integrate multiple indicators to evaluate corporate stability, creditworthiness, and the likelihood of success or failure (Suchanek & Szmelter-Jarosz, 2023). Using indicators such as balance sheet structure, profitability, financial stability ratios, solvency ratios, business activity metrics, and existing risk management practices, this study proposes a comprehensive financial rating methodology for automobile manufacturers listed on international stock exchanges.

4. RESULTS AND DISCUSSION

4.1. New Methodological Rating Approach

The methodological solutions proposed in this study are presented in accordance with the observations and calculations conducted in the relevant steps.

Step 1: The actual values of the variables included in the components of the financial condition indicators for leading companies in the automotive sector (Auto Manufacturers – Foreign and Auto Manufacturers – Domestic) are provided in Appendix A1 and Appendix B1.

The data for Byd Co. LTD (K2=-0.384, K3=-0.762) and Xpeng Inc. Sponsored ADR (K4=-0.123, K5=-0.286, K6=-0.355, K7=-0.343) (from Appendix A1) were not included in the calculations of Table 1.

The data for PACCAR (K2=-4.182, K3=-0.675), Rivian Automotive (K4=-0.324, K5=-0.594, K6=-1.294, K7=-0.841), Lucid (K4=-0.332, K5=-0.583, K6=-4.753, K7=-1.451), and VinFast Auto (K2=-1.841, K3 is negative for Shareholder Equity, K4=-0.437, K5 is negative for Shareholder Equity, K6=-1.409, K7=-1.365, K7=-0.503, K16=-0.435) were also not included in the calculations in Table 1.

Table 1. Recommended ranges for Risk zone, Danger zone and Stability zone for the automotive industry.

Indicators	Risk zone	Danger zone	Stability zone
Indicators assessing the structure of the balance sheet			
Total Current Assets/Total Current Liabilities	It is small. 1.09	1.09-2.29	It is big.2.29
(Total current assets - Total current liabilities) / Total current assets	It is small. 0.08	0.08–0.32	It is big.0.32
(Total current assets - Total current liabilities) / Shareholder equity	It is small.0.09	0.09-0.46	It is big.0.46
Profitability indicators			
Net income / total assets	It is small. 0.02	0.02-0.05	It is big. 0.05
Net income / Shareholder equity	It is small. 0.06	0.06-0.14	It is big. 0.14
EBIT/ Revenue	It is small. 0.02	0.02-0.08	It is big. 0.08
Net income / Cost of goods sold	It is small. 0.02	0.02-0.14	It is big. 0.14
Financial stability ratios			
Shareholder equity / Total assets	It is small. 0.16	0.16–0.39	It is big. 0.39
Total liabilities / Total assets	It is big. 0.61	0.61–0.4	It is small. 0.4
Receivables/Total current liabilities	It is big. 0.28	0.28–0.052	It is small. 0.052
Solvency ratios			
Cash on hand / Total current liabilities	It is small. 0.13	0.13-0.76	It is big. 0.76
(Cash on hand + Receivables) / Total current liabilities	It is small. 0.22	0.22-1.24	It is big. 1.24
Inventory / Total current liabilities	It is small. 0.06	0.06–0.48	It is big. 048
Business activity indicators			
Revenue /Total assets	It is small. 0.43	0.43–0.85	It is big. 0.85
Revenue /Inventory	It is small.3.94	3.94-8.56	It is big. 8.56
Revenue / Shareholder equity	It is small. 1.2	1.2-2.41	It is big.2.41

Table 2. Calculated values for the studied auto manufacturers – foreign corporations.

Indicators	Toyota	Mercedes-Benz Group AG	Volkswagen AG	BMW	Honda	Stellantis	Li Auto	Suzuki	Geely Automobile Holdings	RENAULT	Subaru	Nissan Motor	Isuzu Motors	Mazda Motor	Hyundai Motor
K_1	3	3	3	3	3	3	3	3	3	3	5	3	3	3	3
K_2	3	3	3	3	3	3	5	3	3	3	5	5	5	3	3
K_3	3	3	3	1	3	3	5	3	3	3	5	5	3	3	3
Average (K1;K3)	3.00	3.00	3.00	2.33	3.00	3.00	4.33	3.00	3.00	3.00	5.00	4.33	3.67	3.00	3.00
K_4	5	5	3	3	3	5	5	3	3	1	5	3	5	5	3
K_5	3	5	3	3	3	5	5	3	3	3	5	3	3	3	3
K_6	5	5	3	5	3	5	3	5	3	3	5	3	5	3	3
K_7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Average (K4;K7)	4.00	4.50	3.00	3.50	3.00	4.50	4.00	3.50	3.00	2.50	4.50	3.00	4.00	3.50	3.00
K_8	5	3	3	3	5	5	5	5	5	3	5	3	5	5	3
K_9	3	1	1	1	3	3	3	3	3	1	3	1	3	3	1
K_{10}	1	1	1	1	1	3	5	3	1	1	5	1	1	3	1
Average (K8;K10)	3.00	1.67	1.67	1.67	3.00	3.67	4.33	3.67	3.00	1.67	4.33	1.67	3.00	3.67	1.67
K_{11}	3	3	3	3	3	3	5	3	3	3	5	3	3	3	3
K_{12}	3	3	3	3	3	3	5	3	3	3	3	5	3	3	3
K_{13}	3	3	3	3	3	3	3	3	3	3	3	3	5	3	3
Average (K11;K13)	3.00	3.00	3.00	3.00	3.00	3.00	4.33	3.00	3.00	3.00	3.67	3.67	3.67	3.00	3.00
K_{14}	3	3	3	3	3	5	5	5	5	3	5	3	5	5	3
K_{15}	5	3	3	3	3	5	5	5	5	5	3	3	3	3	5
K_{16}	3	3	3	3	3	3	3	3	3	3	3	3	3	5	3
Average (K14;K16)	3.67	3.00	3.00	3.00	3.00	4.33	4.33	4.33	4.33	3.67	3.67	3.00	3.67	4.33	3.67
Rating	16.67	13.50	12.00	11.83	12.00	14.83	17.00	13.83	13.33	12.17	16.83	14.00	15.00	13.83	12.67

Source: https://www.macrotrends.net/stocks/industry/8/auto-manufacturers---foreign.

Step 2: For the automotive manufacturing sector, based on aggregated data from the studied companies (Auto Manufacturers – Foreign and Auto Manufacturers – Domestic), the intervals of the proposed components of the financial condition indicators (Risk Zone, Danger Zone, and Stability Zone) are presented in Table 1. The calculations presented in Appendix A1 and Appendix B1 were used to determine these ranges.

For indicators K1–K16, the classification logic differs: for K9 and K10, upper boundary intervals were applied in risk classification, while for all other indicators, lower boundary intervals were used. To determine these intervals, the mean, maximum, and minimum values of the aggregated indicators were calculated. Data that caused significant deviations were filtered out, and based on risk factor assessment, three zones were distinguished: Risk Zone, Danger Zone, and Stability Zone.

Step 3: In this step, the risk-based rating evaluation was calculated for each indicator included in the components of the financial condition indicators. The financial condition assessments and the integral rating evaluation for Auto Manufacturers – Foreign companies are presented in Table 2.

Within the Auto Manufacturers – Foreign sector, the proposed approach produced the following results: Li Auto achieved the highest score (17.00), followed by the Japanese companies Subaru (16.83) and Toyota (16.67). The lowest rating was recorded for BMW (11.83).

According to the components of the financial condition, the companies with the highest average scores were as follows:

- Indicators Assessing the Structure of the Balance Sheet (IACB): Subaru – 5.
- Profitability Indicators (PI): Mercedes-Benz Group AG, Stellantis, and Subaru – 4.5.
- Financial Stability Ratios (FSR): Li Auto and Subaru – 4.33.
- Solvency Ratios (SR): Li Auto – 4.33.
- Business Activity Indicators (BAI): Stellantis, Li Auto, Suzuki, Geely Automobile Holdings, and Mazda Motor – 4.33.

Subaru stands out as a leader under the IACB component among the Auto Manufacturers – Foreign group. The company also demonstrates strong performance in Profitability Indicators (PI) and Financial Stability Ratios (FSR). However, Subaru shows weaknesses in Solvency Ratios (SR) and Business Activity Indicators (BAI), suggesting areas for improvement in financial management effectiveness. In contrast, the Chinese company Li Auto leads in FSR, SR, and BAI, reflecting stronger financial resilience and operational efficiency in these dimensions.

In Figure 1, the calculated rating evaluations for Auto Manufacturers – Foreign companies, based on the proposed approach, are presented.

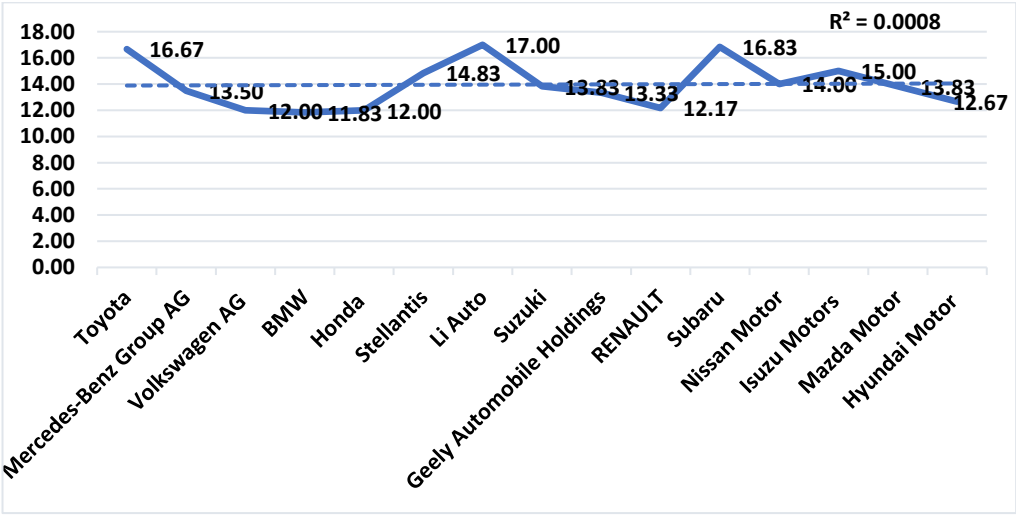

Figure 1. Ratings of the auto manufacturers – Foreign corporations.

The risk assessment of the financial condition components and the integrated score rating for the Auto Manufacturers – Domestic studied companies are presented in Table 3.

Table 3. Key indicators for auto manufacturers – Domestic corporations.

Indicators	Tesla	General Motors	Ford Motor	Harley-Davidson	Polaris	Blue Bird	Fox factory holding
K_1	3	3	5	3	3	3	5
K_2	5	3	5	5	3	3	5
K_3	3	3	5	5	3	5	3
Average (K1;K3)	3.67	3.00	5.00	4.33	3.00	3.67	4.33
K_4	5	3	3	3	3	5	5
K_5	3	3	3	3	3	5	3
K_6	3	3	3	3	3	5	5
K_7	3	3	3	3	1	3	3
Average (K4;K7)	3.50	3.00	3.00	3.00	2.50	4.50	4.00
K_8	5	3	1	3	3	3	5
K_9	5	1	1	1	1	1	3
K_{10}	3	1	3	3	3	3	3
Average (K8;K10)	4.33	1.67	1.67	2.33	2.33	2.33	3.67
K_{11}	5	3	5	3	1	3	3
K_{12}	5	3	5	3	1	3	3
K_{13}	3	3	5	3	5	5	5
Average (K11;K13)	4.33	3.00	5.00	3.00	2.33	3.67	3.67
K_{14}	3	3	3	1	5	5	3
K_{15}	3	5	5	3	3	5	1
K_{16}	3	5	5	3	5	5	1
Average (K14;K16)	3.00	4.33	4.33	2.33	4.33	5.00	1.67
Rating	18.83	15.00	19.00	14.99	14.49	19.17	17.34

For the automotive manufacturing sector (Auto Manufacturers – Domestic), the highest score was obtained by Blue Bird (19.17), followed by Ford Motor (19.00) and Tesla (18.33), the sector's capitalization leader. The lowest score was recorded for Polaris (14.49).

According to the components of the financial condition, the companies with the highest average scores were as follows:

- Indicators Assessing the Structure of the Balance Sheet (IACB): Ford Motor – 5.
- Profitability Indicators (PI): Blue Bird – 4.5.
- Financial Stability Ratios (FSR): Tesla – 4.33.
- Solvency Ratios (SR): Ford Motor – 5.
- Business Activity Indicators (BAI): Blue Bird – 5.

Among the studied organizations, Ford Motor stands out as a leader in the IACB component, demonstrating exceptional control over balance sheet structure. This company also performs effectively in Solvency Ratios (SR). Blue Bird, on the other hand, demonstrates strong performance in SR and BAI, reflecting effective financial and operational management. Among the sector's capitalization leaders, Tesla excels primarily in the FSR component, while showing comparatively lower performance in other areas of financial condition.

In Figure 2, the calculated rating evaluations for Auto Manufacturers – Domestic companies are presented (calculations are based on the data provided in Table 3).

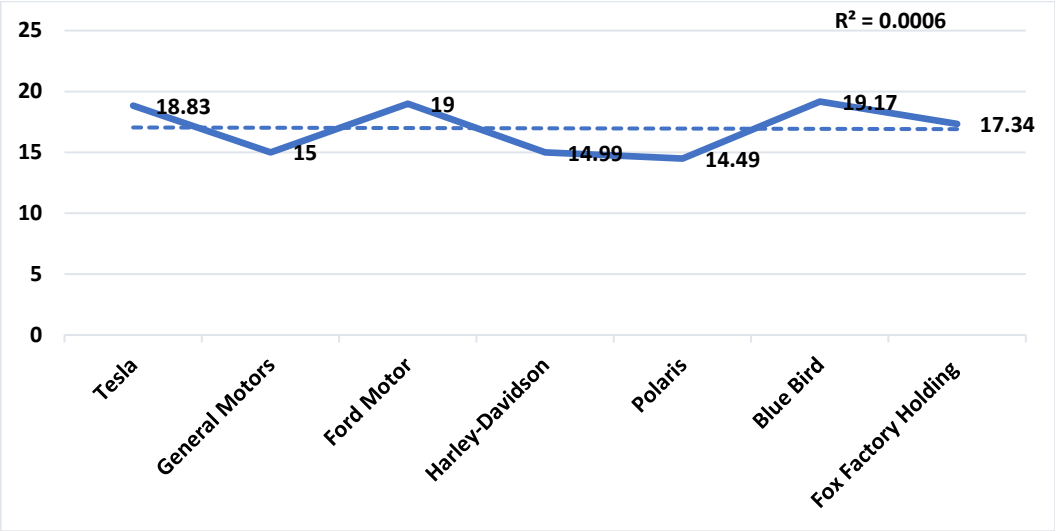

Figure 2. Ratings for auto manufacturers – Domestic.

Inference: The mathematical trends of the rating evaluations for Auto Manufacturers - Foreign and Auto Manufacturers - Domestic studied companies are quite close to each other, and the proposed approach shows high potential for monitoring financial management tools' stability and performance.

4.2. Financial Risk Assessment

Based on the average scores of each indicator group, the financial risk map for Auto Manufacturers - Foreign studied companies is presented in Table 4. The aim is to highlight general issues regarding the risks associated with the financial condition component in the financial management process.

From the financial risk map in Table 4, it becomes clear that financial management in auto manufacturers foreign companies is weak in controlling the IACB and SR components of the financial condition, while control of the FSR component is at a medium level. Effective financial management is assessed for PI and BAI components (The calculation in this table is based on the data from) Table 2).

Table 4. Financial risk map for auto manufacturers – Foreign corporations.

Indicators	Toyota	Mercedes-Benz Group AG	Volkswagen AG	BMW	Honda	Stellantis	Li Auto	Suzuki	Geely automobile holdings	RENAULT	Subaru	Nissan Motor	Isuzu Motors	Mazda Motor	Hyundai Motor
Average (K1;K3)	3.00	3.00	3.00	2.33	3.00	3.00	4.33	3.00	3.00	3.00	5.00	4.33	3.67	3.00	3.00
IACB	Danger zone	Danger zone	Danger zone	Danger zone	Danger zone	Danger zone	Stability zone	Danger zone	Danger zone	Danger zone	Stability zone	Stability zone	Stability zone	Danger zone	Danger zone
Average (K4;K7)	4.00	4.50	3.00	3.50	3.00	4.50	4.00	3.50	3.00	2.50	4.50	3.00	4.00	3.50	3.00
PI	Stability zone	Stability zone	Danger zone	Stability zone	Danger zone	Stability zone	Stability zone	Stability zone	Danger zone	Danger zone	Stability zone	Danger zone	Stability zone	Stability zone	Danger zone
Average K8;K10	3.00	1.67	1.67	1.67	3.00	3.67	4.33	3.67	3.00	1.67	4.33	1.67	3.00	3.67	1.67
FSR	Danger zone	Danger zone	Danger zone	Danger zone	Danger zone	Stability zone	Stability zone	Stability zone	Danger zone	Danger zone	Stability zone	Danger zone	Danger zone	Stability zone	Danger zone
Average K11;K13	3.00	3.00	3.00	3.00	3.00	3.00	4.33	3.00	3.00	3.00	3.67	3.67	3.67	3.00	3.00
SR	Danger zone	Danger zone	Danger zone	Danger zone	Danger zone	Danger zone	Stability zone	Danger zone	Danger zone	Danger zone	Stability zone	Stability zone	Stability zone	Danger zone	Danger zone
Average K14;K16	3.67	3.00	3.00	3.00	3.00	4.33	4.33	4.33	4.33	3.67	3.67	3.00	3.67	4.33	3.67
BAI	Stability zone	Danger zone	Danger zone	Danger zone	Danger zone	Stability zone	Stability zone	Stability zone	Stability zone	Stability zone	Stability zone	Danger zone	Stability zone	Stability zone	Stability zone

Table 5. Weights of financial condition components in the rating calculated for the Auto Manufacturers - Foreign organizations.

	Toyota	Mercedes-Benz Group AG	Volkswagen AG	BMW	Honda	Stellantis	Li Auto	Suzuki	Geely Automobile Holdings	RENAULT	Subaru	Nissan motor	Isuzu motors	Mazda motor	Hyundai motor
Indicators assessing the structure of the balance sheet	18	22.22	25	19.72	25	20.22	25.49	21.69	22.5	24.66	29.7	30.95	24.44	21.69	23.68
Profitability indicators	24	33.33	25	29.58	25	30.34	23.53	25.3	22.5	20.55	26.73	21.43	26.67	25.3	23.68
Financial stability ratios	18	12.35	13.89	14.08	25	24.72	25.49	26.51	22.5	13.7	25.74	11.9	20	26.51	13.16
Solvency ratios	18	22.22	25	25.35	25	20.22	25.49	21.69	22.5	24.66	21.78	26.19	24.44	21.69	23.68
Business activity indicators	22	22.22	25	25.35	25	29.21	25.49	31.33	32.5	30.14	21.78	21.43	24.44	31.33	28.95
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

4.3. Financial Condition Assessment

In Table 5, the weighted ratios of the financial condition components for Auto Manufacturers - Foreign studied companies are presented (The calculation in this table is based on the data from Table 2).

According to the calculations in Table 5, the components with the highest weight are:

- Indicators assessing the structure of the balance sheet (IACB) – Nissan Motor (30.95%) and Subaru (29.7%).
- Profitability indicators (Pi) - Mercedes-Benz Group (33.3%).
- Financial stability ratios (FSR) - Suzuki (26.51%) and Mazda Motor (26.51%).
- Solvency ratios (SR)- Nissan Motor (26.19%).
- Business activity indicators (BAI) - Geely Automobile (32.50%).

Regarding the mathematical trends of specific financial condition components, the R-squared values for IACB ($R^2 = 0.2061$), PI ($R^2 = 0.1764$), FSR ($R^2 = 0.0185$), SR ($R^2 = 0.0544$), and BAI ($R^2 = 0.122$) are presented based on the data in Table 4.

Based on the average scores of each indicator group, the financial risk map for Auto Manufacturers - Domestic studied companies is presented in Table 6 (The calculation in this table is based on the data from Table 3).

Table 6. Financial risk map for auto manufacturers – Domestic corporations.

Indicators	Tesla	General Motors	Ford Motor	Harley-Davidson	Polaris	Blue Bird
Average (K1;K3)	3.67	3.00	5.00	4.33	3.00	3.67
IACB	Stability zone	Danger zone	Stability zone	Stability zone	Danger zone	Stability zone
Average (K4;K7)	3.50	3.00	3.00	3.00	2.50	4.50
PI	Stability zone	Danger zone	Danger zone	Danger zone	Danger zone	Stability zone
Average (K8;K10)	4.33	3.00	5.00	3.00	2.33	3.67
FSR	Stability zone	Danger zone	Stability zone	Danger zone	Danger zone	Danger zone
Average (K11;K13)	4.33	3.00	5.00	3.00	2.33	3.67
SR	Stability zone	Danger zone	Stability zone	Danger zone	Danger zone	Stability zone
Average (K14;K16)	3.00	4.33	4.33	2.33	4.33	5.00
BAI	Danger zone	Stability zone	Stability zone	Danger zone	Stability zone	Stability zone

The financial risk map presented in Table 6 shows that in the financial management process of the studied organizations in the Auto Manufacturers – Domestic category, control over the FSR (Financial Stability Ratios) component is weak. Control over the PI (Profitability Indicators) component is at an average level. Financial management is evaluated as effective in the areas of IACB (Indicators Assessing the Structure of the Balance Sheet), SR (Solvency Ratios), and BAI (Business Activity Indicators).

Table 7. Weights of financial condition components in the calculated rating assessment for domestic auto manufacturers.

	Tesla	General Motors	Ford Motor	Harley-Davidson	Polaris	Blue bird	Fox factory holding
Indicators assessing the structure of the balance sheet	19.49	20.00	26.32	28.88	20.70	19.14	24.98
Profitability indicators	18.58	20.00	15.79	20.01	7.25	23.47	23.07
Financial stability ratios	23.01	11.11	8.77	15.56	16.10	12.17	21.15
Solvency ratios	22.99	20.00	26.32	20.01	16.08	19.14	21.17
Business activity indicators	15.93	28.87	22.79	15.54	29.88	26.08	9.63
Total	100.00	100.00	1 00.00	100.00	100.00	100.00	100.00

In Table 7, the weighted ratios of the financial condition components for Auto Manufacturers - Domestic studied companies are presented. The calculations in Table 7 show that the highest weight is assigned to:

- Indicators assessing the structure of the balance sheet (IACB) – Harley-Davidson (28.8%).
- Profitability indicators (Pi) - Blue Bird (23.47%).
- Financial stability ratios (FSR) - Tesla (23.01%).
- Solvency ratios (SR) - Ford Motor (26.32%).
- Business activity indicators (BAI) - Polaris (29.88%).

Regarding the mathematical trends of specific financial condition components, the R-squared values for IACB ($R^2 = 0.0328$), PI ($R^2 = 0.3537$), FSR ($R^2 = 0.0033$), SR ($R^2 = 0.1757$), and BAI ($R^2 = 0.0305$) are presented based on the data in Table 4.

Inference: In the automotive manufacturing sector, the most efficiently controlled component of the financial condition is identified as BAI. The distribution of the financial condition components based on the proposed financial condition rating approach is quite close in terms of integrated rating evaluation. The results show that the financial condition components we identified, with their included indicators, play a crucial role in the process of controlling the effectiveness of financial management.

5. CONCLUSION

The results of the assessment for the companies listed on the stock exchange are summarized as follows:

- *Product Price Risk:* Automobile manufacturing companies are highly dependent on product price risk. Fluctuations in prices can increase production costs and affect pricing strategies. The volatility of raw material prices in global markets requires manufacturers to implement risk management strategies, such as hedging or long-term supply contracts.
- *Currency Risk:* The automobile industry is significantly exposed to currency risk, particularly for companies operating in multiple countries with different currencies. Exchange rate fluctuations can greatly impact the profitability of automobile companies, especially those exporting vehicles or importing critical components.
- *Interest Rate Risk:* Changes in interest rates directly affect financing costs. Automobile companies often rely on debt financing for capital expenditures, making them vulnerable to rising interest rates. Such changes can substantially impact the cost of capital, particularly for highly leveraged firms.
- *Credit Risk:* Credit risk arises when a customer, supplier, or business partner fails to meet financial obligations. Automobile manufacturers face credit risk from both consumers and suppliers. Companies that offer financing options, such as car loans or leases, are exposed to the risk of default.
- *Consumer Loan Risk:* Since automobile companies frequently provide loans to customers, consumers' ability to repay these loans affects the manufacturer's financial stability. Companies typically assess customers' creditworthiness and employ risk-based pricing to adjust loan terms and interest rates according to individual credit scores.
- *Supplier Risk:* Automobile companies rely on suppliers for essential components. If suppliers experience financial difficulties, it can lead to delayed deliveries or supply chain disruptions, which in turn impact production schedules and costs.
- *Liquidity Risk:* Managing liquidity is critical for automobile manufacturers, particularly during periods of low sales, production interruptions, or increased capital expenditure needs. Many companies in the sector rely on short-term financing arrangements to meet their working capital requirements.
- *Investment and R&D Risk:* As automakers transition to new technologies in electric and transportation vehicles, securing substantial funding for R&D and new infrastructure is essential. Automobile companies can mitigate liquidity risk by diversifying financing sources, including corporate bond issuances, equity offerings, or strategic partnerships with technology companies.

Based on the results of the analysis, we recommend the following:

- *Market Risk Mitigation:* Implement currency hedging strategies using forward contracts or options to protect against exchange rate fluctuations.
- *Liquidity Management:* Maintain operational stability through cash flow forecasting and efficient working capital management:
- Organize short-term financing options, such as revolving credit lines, if liquidity is tight.
- Reduce high-interest debt in companies with elevated debt-to-equity ratios to minimize financial risk.
- Optimize inventory levels to free up cash and improve liquidity.
- Extend supplier payment terms strategically to optimize cash flow.
- Review and tighten credit policies to minimize bad debts and ensure predictable cash flows.
- Conduct targeted sales campaigns using customer data to focus on high-potential segments and regions.
- Increase operational profitability by improving efficiency and enhancing EBIT; strong cash flows help maintain a healthy interest coverage ratio.
- Review debt terms or restructure high-interest obligations to reduce overall interest expenses.
- Monitor market value of debt closely, limiting borrowings during periods of debt expansion.
- Diversify financing sources and, where possible, use lower-cost equity financing to reduce reliance on debt.

These measures collectively contribute to more resilient financial management, mitigating risks, and enhancing the operational and strategic performance of automobile manufacturing companies.

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