UDC 330.341.1:338.45:658.14
JEL Classification: D24, L62, G32, O33

MODELING ECONOMIC EFFICIENCY AND BUSINESS RESILIENCE UNDER FULL-SCALE WAR

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The article examines approaches to assessing the economic efficiency and financial-economic resilience of businesses under conditions of full-scale war. The study analyzes the operating characteristics of the automotive sector amid changes in the business climate, heightened security threats, unstable demand, and increasing resource costs. The need to distinguish between the current efficiency of resource utilization and enterprises' ability to maintain stable financial performance over time is substantiated. A balanced panel of 25 active automotive dealerships from different regions of Ukraine, which maintained operations throughout the entire period of the full-scale war covered by the study (2022–2025), was constructed. Based on publicly available financial statements, the dynamics of revenues, profitability, and resource productivity were analyzed. An original two-criteria assessment model is proposed, integrating developed composite indices of economic efficiency and financial-economic resilience. The indices incorporate indicators of net profit margin, revenue per employee, asset turnover, revenue growth dynamics and variability, and the stability of financial performance. Based on the relationship between the composite indices, an enterprise positioning matrix was constructed. Four business types were identified: strategically balanced, resilience-oriented, operationally efficient, and critically vulnerable enterprises. The modeling results reveal heterogeneous relationships among the individual components used to assess business efficiency and resilience, as well as discrepancies between asset size, absolute profit, and sales profitability. The distinguishing characteristics of each business type were identified, together with corresponding managerial priorities, including maintaining efficiency and resilience reserves in strategically balanced enterprises, improving productivity, strengthening business continuity planning, and diversifying risks. The applicability of the proposed matrix as an instrument for comparative enterprise diagnostics is substantiated, taking into account the relative nature of the classification and its sensitivity to methodological assumptions.

Keywords: economic efficiency, resilience, business analysis, automotive dealerships, composite index, wartime economy, matrix model, business climate

https://doi.org/10.31891/mdes/2026-22-45

Стаття надійшла до редакції / Received 22.09.2026
Прийнята до друку / Accepted 17.10.2026
Опубліковано / Published 12.11.2026

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INTRODUCTION

Russia's full-scale invasion has fundamentally altered the operating environment of Ukrainian businesses. Alongside conventional market risks, firms face recurring power disruptions, asset destruction, labour shortages, demand volatility, logistics losses and regulatory uncertainty. Enterprises must sustain current performance while retaining the capacity to continue operations following disruptive shocks. Economic efficiency captures the results achieved through resource utilisation, whereas resilience reflects the capacity to maintain, restore and adapt critical functions under adverse conditions. Competitiveness emerges from the interaction of these attributes and a firm's ability to pursue longer-term strategic opportunities.

According to the March 2026 survey conducted by Deloitte and the American Chamber of Commerce in Ukraine [1], the wartime business climate is shaped by a range of interconnected challenges. In particular, 57% of respondents identified electricity supply disruptions as a destabilising factor, 55% cited security risks, and 49% reported workforce shortages. Rising operating costs were considered a critical challenge by 38%; meanwhile, 64% had optimised operating expenses, 42% had revised investment plans and 34% had adjusted pricing policies. Formal business continuity plans were in place at 58% of surveyed firms, while 37% reported accelerated digitalisation. Moreover, the aggregate resilience index of surveyed companies was 58%, while its financial component stood at 43%; 62% of respondents reported a risk of electricity interruptions.

A broader perspective is provided by the European Business Association: in February 2026, 76% of surveyed businesses intended to continue operating in Ukraine regardless of whether the war ended within the following year [2]. A September survey by the Institute for Economic Research and Policy Consulting reported that the share of firms operating at or near full capacity had fallen to 52%, while 67% identified labour shortages as an obstacle [3]. A nationwide UNDP study surveyed 628 managers of micro-, small

and medium-sized enterprises. These different respondent profiles permit qualitative comparison of findings but do not constitute a unified representative panel [4].

These findings reveal a fundamental managerial trade-off. Cost reductions can improve short-term financial ratios while eroding reserves needed for resilience. Conversely, investments in backup power, cybersecurity, digital service channels and redundant supply arrangements may initially increase expenditure while reducing the probability of interrupted operations. Assessing efficiency alongside resilience therefore requires a multidimensional analytical framework.

Automotive dealerships provide a relevant empirical setting. Their economic role extends beyond vehicle sales to household mobility, business logistics, vehicle servicing and related industries. Their dependence on resources, exposure to external shocks, need for operational flexibility and geographical dispersion create suitable conditions for applying a two-criteria index–matrix model. Such an approach distinguishes firms by current performance and the stability of their financial outcomes. During post-war recovery, dealerships' ability to sustain operations, maintain access to vehicles and services, and respond to structural shifts in demand may also support the restoration of regional economic linkages and business activity.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

The literature examines wartime business management through the lenses of crisis adaptation, organisational resilience and financial stability. Opatska et al. highlight improvisation, managerial flexibility and crisis leadership in Ukrainian companies [5], while Dligach and Stavytskyy identify institutional uncertainty as a significant constraint on SME resilience [6]. De Waal et al. explore heterogeneous revenue-recovery trajectories [7], and Shcherbak et al. reveal regional differences in financial risks and enterprise resilience [8]. Business continuity research further distinguishes operational survival from recovery and transformation capabilities [9]. Digital transformation is increasingly recognised as a mechanism of organisational adaptation. Browder et al. examine the resilience-enhancing role of digital capabilities [10], Khurana et al. conceptualise SME resilience through dynamic capabilities [11], and Ozorovych and Matsola emphasise hybrid digital infrastructure in Ukrainian enterprises [12]. Related studies establish connections among resilience, security, competitiveness and the green–digital transition [13], as well as synergies between digitalisation and decarbonisation [14]. The OECD similarly identifies digital transformation as a strategic priority for strengthening business resilience in Ukraine [15].

From a methodological perspective, Reznikov develops an investment-based framework for evaluating digital strategies under wartime uncertainty, incorporating ROI, payback period, NPV and scenario analysis [16]. Additional studies address digital customer interactions in wartime e-commerce [17], innovation and human capital as drivers of competitiveness [18], artificial intelligence and corporate investment efficiency [19], and firms' financial responses to armed conflicts [20].

Sector-specific scholarship provides an additional basis for examining automotive businesses. Maistro and Biletskyi examine the efficiency of automotive retail and servicing enterprises in Ukraine under martial law, identifying weakened purchasing power, higher spare-parts costs and disrupted logistics as pressures on operating performance; their analysis also discusses adaptive business practices [21]. Mastepan develops an approach to evaluating the development of production capacity in automotive service enterprises, foregrounding the allocation of resources and the effectiveness of service operations [22]. At the broader cross-sector level, Polchanov et al. use quantitative modelling to investigate the relationships between profitability, capital structure, business activity and industry characteristics among Ukrainian enterprises [23]. Together, these studies substantiate the importance of sectoral context and resource utilisation. However, the automotive-sector studies do not provide a comparable longitudinal, two-criteria classification of dealerships based on current efficiency and the stability of financial outcomes during the full-scale war.

A remaining research gap is the lack of a comparable instrument that simultaneously captures enterprises' current economic efficiency and the intertemporal stability of their financial outcomes, while enabling transparent positioning along both dimensions. Single-indicator assessments based on profit margins or sales volumes can obscure substantial variation over time. This article addresses that gap using the relatively homogeneous business segment of automotive dealerships.

THE AIM AND OBJECTIVES OF THE STUDY

The aim of this article is to develop and apply an index–matrix model for evaluating business economic efficiency and financial–economic resilience, using Ukrainian automotive dealerships in 2022–

2025 as the empirical setting, and to assess the relationship between these dimensions under wartime uncertainty.

The research tasks are to construct a comparable panel from publicly available accounts; calculate indicators of current efficiency and dynamic financial stability; develop and interpret composite indices; establish a typology of strategic positioning; and assess relationships among indicators and the limitations of the model.

PRESENTATION OF THE MAIN MATERIAL OF THE STUDY

A distinctive feature of automotive dealerships is their substantial need for working capital and physical infrastructure alongside a requirement for high organisational adaptability. Inventory holdings, retail and service facilities, logistics operations and contractual obligations all generate significant resource requirements. Shifts in market conditions and consumer demand necessitate timely adjustments to product portfolios, distribution channels, service provision and managerial processes. Economic performance thus depends on the alignment between the resource base, the intensity of its utilisation and management's ability to maintain business continuity. It is analytically important to distinguish the scale of operations, economic efficiency and financial–economic resilience. A substantial resource base and rising sales may enable higher absolute financial returns, but they do not guarantee corresponding improvements in margins, asset productivity or the persistence of profitability over time. Recurring external shocks may produce divergent trajectories in operating and financial indicators, making multidimensional assessment necessary. The analytical framework therefore examines efficiency together with a firm's ability to maintain financial stability, adapt business processes and restore performance following disruptions.

The empirical basis comprises a purposively selected balanced panel of 25 legal entities engaged in automotive dealership activities across several Ukrainian regions. Comparable public data are available for the four complete calendar years of the full-scale war, 2022–2025. Revenue, net profit or loss, total assets, total liabilities and employee counts were collected from public financial records available through Opendatabot and organised into a reproducible dataset [25].

The geographical coverage allows comparisons of financial profiles among firms operating under different local economic conditions. However, regional diversity alone does not establish a relationship between company performance and regional business-climate characteristics. Figure 1 reports the distribution of sampled firms by region of registration.

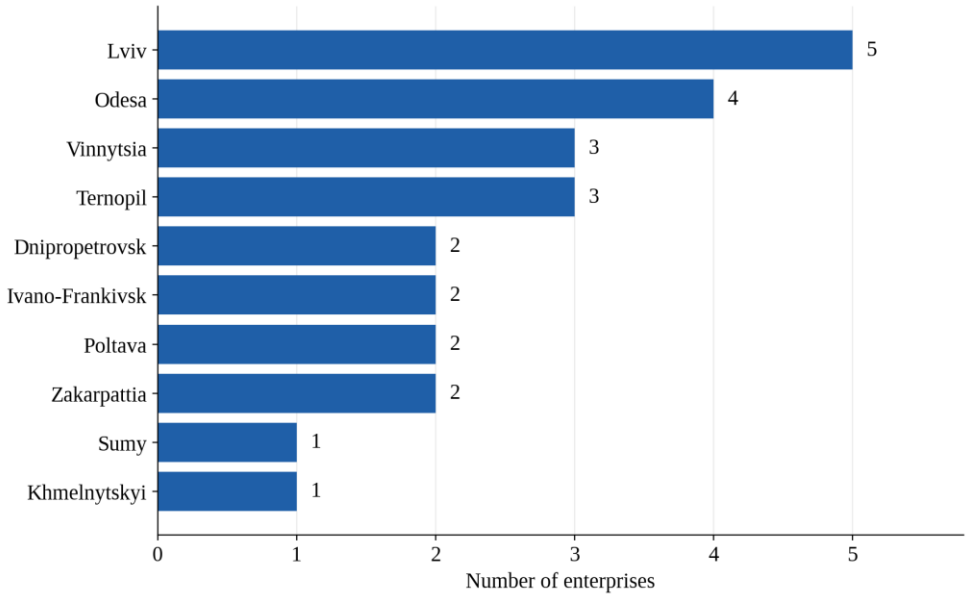


Fig. 1. Regional distribution of sampled automotive dealerships by registered location (n = 25).
Source: authors' sample based on open data [24]

Within the sample, median nominal revenue increased from UAH 239.79 million in 2022 to UAH 533.94 million in 2025. Without deflating these current-price values and obtaining physical sales data, the increase cannot be interpreted as equivalent growth in real output. The figures are also sensitive to the composition of the selected sample.

Interpreting this pattern requires consideration of the business climate during the war, particularly inflation, exchange-rate movements, vehicle-price changes, logistics disruptions and uneven purchasing power. Differences in dealership business models, market segments, the share of after-sales services and

the extent of outsourcing may also affect nominal turnover. The data do not permit the separate contributions of these factors to be quantified. Revenue trends must therefore be compared with relative performance measures: a firm may expand the monetary value of sales without a corresponding increase in profitability. This motivates a progression from nominal business scale to the measurement of economic efficiency and the subsequent examination of the stability of financial outcomes.

Taking these considerations, Net profit margin (NPM) was selected as the initial performance indicator. It expresses the share of net financial profit or loss in net sales revenue and enables comparisons between firms of different sizes. NPM was calculated as follows:

$$NPM_{\text{it}} = \frac{NP_{\text{it}}}{REV_{\text{it}}} \times 100\% \quad (1)$$

where NPM_{it} is the net profit margin of firm i in year t (%); NP_{it} is its net profit or loss (UAH million); REV_{it} is its net sales revenue (UAH million); i - denotes the firm; and t - denotes the observation year. A negative NP_{it} produces a negative margin.

Net profit margins followed a different path from nominal revenue: the annual medians were 3.46% (2022), 4.12% (2023), 2.83% (2024) and 2.94% (2025). It is essential to examine the dispersion around the median and extreme observations, since a profitable majority may coexist with substantial losses at individual firms.

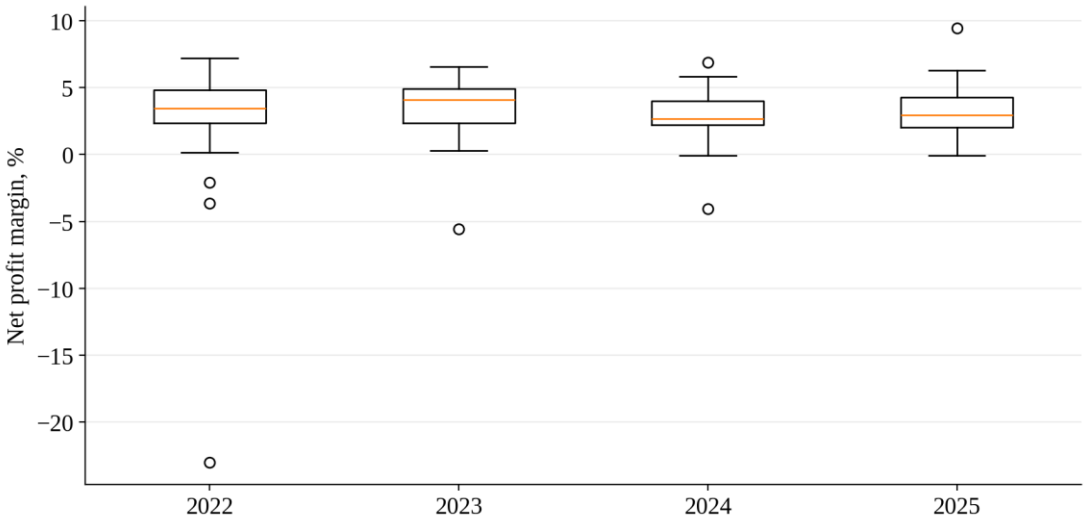


Fig. 2. Distribution of automotive dealerships' net profit margins, 2022–2025
Source: authors' visualization

The distribution of net profit margins (Fig. 2) exhibits a marked difference between central values and certain extreme observations. The box plots show medians, interquartile ranges and statistical outliers. Negative outliers indicate that severe losses at individual firms can occur even when the central tendency remains positive. This further motivates an assessment of the persistence of financial results and an examination of whether extreme losses are associated with firm size, inventory composition, the share of service operations or regional risk exposure.

The research problem required an assessment of current efficiency and its consistency with the stability of financial results under recurring wartime shocks. No single ratio captures both dimensions. Profit margin measures the proportion of sales retained as profit; revenue per employee measures nominal output per worker; and asset turnover reflects the intensity of resource utilisation. Minimum revenue growth, the variability of annual growth rates and the frequency of profitable years capture complementary dimensions of temporal stability. Accordingly, a two-criteria index–matrix model was adopted with two analytically distinct axes: composite economic efficiency (E) and composite financial–economic resilience (R). The model enables comparisons across different firm sizes, synthesises heterogeneous indicators and identifies cases in which strong current results coexist with weak temporal stability, or vice versa.

To construct E, two measures of resource utilisation were used alongside net profit margin. The first is revenue per employee (RPE), which captures nominal sales revenue per worker and is calculated as:

$$RPE_{\text{it}} = \frac{REV_{\text{it}}}{EMP_{\text{it}}} \quad (2)$$

where RPE_{it} is revenue per employee at firm *i* in year *t* (UAH million per person); REV_{it} is the firm's net sales revenue in year t (UAH million); EMP_{it} is the number of employees (persons); *i* - denotes the firm; and *t* - denotes the observation year. This indicator describes revenue generated per employee rather than physical labour productivity.

The second indicator is approximate asset turnover (*AT*), measuring net sales revenue per unit of reported assets. Owing to data constraints, the denominator uses total assets at year-end rather than average assets over the period. AT must therefore be distinguished from the standard asset turnover ratio:

$$AT_{\text{it}} = \frac{REV_{\text{it}}}{A_{\text{it}}} \quad (3)$$

where AT_{it} denotes approximate asset turnover for firm i in year t (times); REV_{it} is net sales revenue (UAH million); A_{it} is the book value of assets at the end of year t (UAH million); *i* - denotes the firm; and *t* - denotes the year.

As an additional descriptor of financial structure, the liabilities-to-assets ratio (LR) was calculated. It captures the balance-sheet burden of liabilities relative to the resource base but is not directly included in either composite index E or R:

$$LR_{\text{it}} = \frac{L_{\text{it}}}{A_{\text{it}}} \times 100\% \quad (4)$$

where LR_{it} is total liabilities as a percentage of assets at firm *i* in year *t*; L_{it} represents total liabilities at year-end (UAH million); A_{it} represents total assets on the same date (UAH million); *i* – denotes the firm; and *t* – the year. LR should not be equated with the share of bank loans or with a liquidity ratio.

The temporal component R requires evaluating revenue preservation and profitability over the entire observation period. Final-year performance alone is insufficient. The annual rate of change in net sales revenue, g_{it}, was used as the core dynamic indicator and calculated as:

$$g_{\text{it}} = \frac{REV_{\text{it}} - REV_{\text{i,t-1}}}{REV_{\text{i,t-1}}} \times 100\% \quad (5)$$

where g_{it} denotes the annual growth rate of net sales revenue for firm *i* in year *t* (%); REV_{it} is revenue in year *t* (UAH million); $REV_{i,t-1}$ is revenue in the preceding year (UAH million); *i* identifies the firm; and *t* is the year. The formula was used to compute growth rates for 2024 and 2025. For each company, three further measures were calculated: the minimum of these two rates (g_i, *min*), their sample standard deviation $\sigma(g_i)$, and the number of years with positive net profit (S_i) over 2022–2025.

The underlying indicators are expressed in different units (percentages, UAH million per employee, turnover multiples and counts of years); direct summation would thus be inappropriate. Sample-based percentile ranks *P(x)*, scaled from 0 to 100, were used to make them comparable. A higher rank indicates a more favourable relative position among the 25 firms, with average ranks assigned to tied values. The direction was reversed for growth variability so that smaller $\sigma(g_i)$ values correspond to more favourable scores. Rank transformation removes dimensional differences but makes the indices relative to this particular sample rather than absolute benchmarks. Equal weights were assigned to the three components of each index in the baseline specification to avoid an unsupported preference for any particular attribute.

The composite economic efficiency index E combines net profit margin, revenue per employee and approximate asset turnover. It is calculated as the arithmetic mean of their normalised ranks:

$$E_{\text{i}} = \frac{P(NPM_{\text{i}}) + P(RPE_{\text{i}}) + P(AT_{\text{i}})}{3} \quad (6)$$

where E_i denotes firm i's composite economic efficiency index on a 0–100 scale; $P(\cdot)$ is the sample percentile-rank transformation; NPM_i is the firm's net profit margin in 2025 (%); RPE_i is its revenue per employee in 2025 (UAH million per person); AT_i is approximate asset turnover in 2025 (times); and i identifies the sampled firm. Each component has an equal weight of one-third.

The composite financial–economic resilience index R captures the relative stability of financial outcomes over time. It combines the minimum observed revenue growth rate, low variability in annual revenue growth and the recurrence of positive net income:

$$R_{\text{i}} = \frac{P(g_{\text{i}},min) + P(-\sigma(g_{\text{i}})) + P(S_{\text{i}})}{3} \quad (7)$$

where R_i denotes the composite financial–economic resilience index for firm i (0–100); $P(\cdot)$ is the percentile rank in the sample; g_i,min is the minimum annual revenue growth rate in 2024–2025 (%); $\sigma(g_i)$ is the sample standard deviation of the two annual growth rates (percentage points); $P(-\sigma(g_i))$ reverses the rank so that lower variability receives a higher score; S_i is the number of profitable years during 2022–2025; and i denotes the firm. The three components are equally weighted at one-third each. R measures the observed persistence of financial outcomes and should not be interpreted as comprehensive operational resilience. The auxiliary difference $G_i = E_i - R_i$ indicates which dimension predominates, it has no monetary interpretation.

The two composite indices provide firm-level coordinates in the space of current efficiency and intertemporal financial stability. Sample median thresholds, E = 50.00 and R = 51.39, were then applied. Median-based cut-offs, rather than pre-established normative thresholds, provide a transparent relative typology within a comparable sector, although quadrant membership consequently depends on sample composition.

Four diagnostic groups were derived from the intersection of the two median thresholds (Fig. 3). This classification captures combinations of the two measured financial–economic attributes rather than an absolute measure of wartime security:

Type 1. Strategically balanced (8 firms)

Type 2. Resilience-oriented (5 firms)

Type 3. Operationally productive (6 firms)

Type 4. Critically vulnerable (6 firms)

The resulting typology reveals heterogeneous relationships between current efficiency and temporal stability. The Spearman rank correlation between the composite indices is weak and statistically insignificant (ρ = 0.220; p = 0.290). In this sample, strong relative efficiency is therefore not systematically accompanied by strong resilience. This supports the use of two analytical dimensions rather than a single composite ranking.

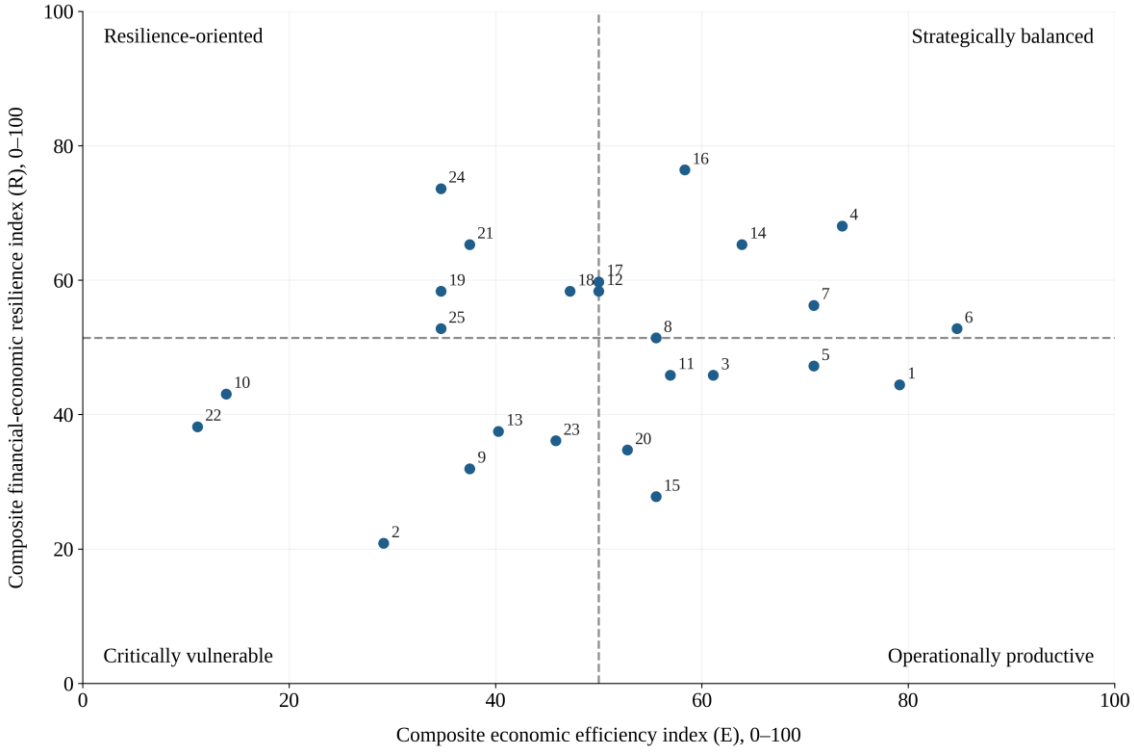


Fig. 3. Two-criteria positioning matrix of automotive dealerships by composite economic efficiency and financial–economic resilience indices

Source: authors' elaboration

Company identifiers in Figs. 3 and 4: 1 – Avtostar Lviv; 2 – Ilta Lviv; 3 – Diamant Service Centre; 4 – Ariia Motors; 5 – Niko Zakhid Premium; 6 – Bavaria Centre; 7 – 3S Group; 8 – Favorit Auto Vinnytsia Trading House; 9 – Almaz Motor Ltd; 10 – Aelita; 11 – Classic Auto; 12 – Alliance-IF; 13 – Artmotor; 14 – Karat Motor; 15 – Premiera Auto; 16 – Inter Auto Centre; 17 – Crystal Motors; 18 – German Auto Ternopil; 19 – Terko Auto Centre; 20 – Inzhproekt; 21 – ViDi Palmira; 22 – Avtograd Odesa; 23 – Meridian Plaza; 24 – Star Line Company; 25 – Autoservice-Alliance.

The matrix shows that greater current economic efficiency may coincide with either higher or lower intertemporal stability. The model thus goes beyond reproducing a profitability ranking by distinguishing the returns to resource utilisation from the relative persistence of financial outcomes over the analysed period.

The matrix also informs differentiated managerial priorities. Strategically balanced firms should preserve performance and investment capacity; resilience-oriented firms should focus on improved resource productivity; operationally productive firms should strengthen reserves and recovery procedures; and critically vulnerable firms require priority attention to liquidity and financial discipline.

Table 1.

Authors' typology of enterprises based on composite economic efficiency and financial–economic resilience indices

Enterprise category	Positioning characteristics based on six indicators	Potential managerial priority
Strategically balanced	Both composite indices equal or exceed their sample medians. Relatively favourable ranks for profit margin, revenue per employee and/or asset turnover are accompanied by favourable minimum revenue growth, lower growth variability and repeated profitable years. Different combinations of components may generate a balanced profile.	Maintain efficiency, monitor stability and undertake evidence-based investment.
Resilience-oriented	R equals or exceeds the median, whereas E is below it. Repeated profitability, lower revenue-growth variability and/or favourable minimum growth support financial stability. Lower ranks for labour revenue productivity, asset turnover or profit margin constrain current efficiency.	Improve resource productivity and operating margins while preserving financial stability.
Operationally productive	E equals or exceeds the median, while R is below it. Relatively high ranks for one or more of profit margin, revenue per employee and asset turnover underpin current performance. Lower minimum revenue growth, greater variability and/or fewer profitable years constrain resilience.	Strengthen revenue stability, scenario planning, reserves and diversification.
Critically vulnerable	Both indices fall below their respective medians. Weaker relative positions in current financial outcomes coincide with unfavourable values for at least some temporal stability indicators. A strong score for one component may fail to compensate for low ranks on the others.	Undertake detailed financial diagnostics, improve margins and strengthen cash-flow resilience.

Company-level profiles demonstrate that membership in each category reflects the combined contribution of six normalised indicators. Within the strategically balanced group, Karat Motor (E = 63.89; R = 65.28) exhibits high approximate asset turnover (8.31 times), four profitable years and relatively low revenue-growth variability (5.90 percentage points). Inter Auto Centre (E = 58.33; R = 76.39) records a high minimum annual revenue growth rate (28.91%), moderate variability (7.02 percentage points) and four profitable years. These characteristics underpin its high R, while efficiency reflects the combined ranks of operational indicators. A balanced position can therefore arise from different combinations of asset utilisation and financial stability.

For resilience-oriented firms, temporal stability tends to exceed current resource productivity. Star Line Company (E = 34.72; R = 73.61), for example, has four profitable years, the lowest revenue-growth variability among the cited examples (3.15 percentage points), and positive minimum growth (10.34%), but relatively low asset turnover (2.41 times). ViDi Palmira displays a similar asymmetry (E = 37.50; R = 65.28): despite four profitable years and minimum revenue growth of 17.42%, asset turnover is 3.16 times and net profit margin is 1.37%. A high R therefore does not require uniformly high values for the three components of E.

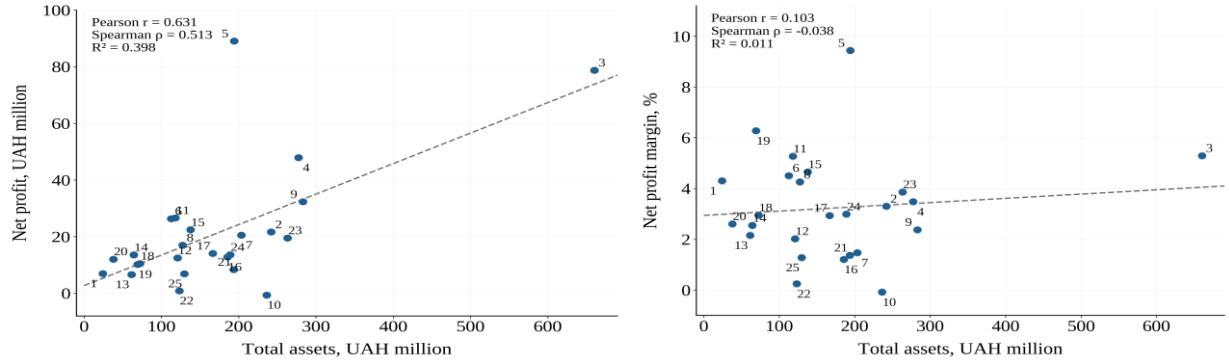
Operationally productive firms show the reverse configuration. Avtostar Lviv has E = 79.17 and R = 44.44: its current efficiency is supported by asset turnover of 6.73 times, revenue per employee of UAH 13.53 million and a net profit margin of 4.30%, whereas minimum annual revenue growth over the observation interval is negative (−0.88%). At Niko Zakhid Premium (E = 70.83; R = 47.22), a high net profit margin (9.44%) coexists with more substantial revenue-growth variability (26.15 percentage points). Strong performance in an individual year does not eliminate instability in financial trends.

In the critically vulnerable group, low scores on both indices arise through different mechanisms. Aelita (E = 13.89; R = 43.06) recorded a negative net profit margin in 2025 (−0.08%), low revenue per employee (UAH 5.49 million) and only one profitable year out of four; low revenue-growth variability (1.13 percentage points) was insufficient on its own to produce a high R. Avtograd Odesa (E = 11.11; R = 38.19)

combined a low margin (0.25%), revenue per employee of UAH 5.93 million and pronounced revenue-growth variability (32.25 percentage points), despite positive minimum growth. These examples underline the need to consider the indicators jointly rather than drawing conclusions from any single financial ratio.

These four categories are relative diagnostic positions within the sample, not measures of physical losses, solvency or the probability of business closure. Alternative weighting retained the original group allocation for 16 of the 25 firms, whereas nine were reassigned. Firms situated near the median boundaries warrant additional sensitivity testing, cash-flow analysis and consideration of internal managerial information.

Following the construction of the composite indices and positioning matrix, a further analytical question arises: can the financial differences among dealerships be explained simply by the scale of their asset base? Taking this consideration, Figure 4 offers a separate examination of the economic rationale underlying the model: the need to distinguish business size from efficiency. Two cross-sectional relationships were estimated for 2025 using the same 25 firms: total assets versus net profit, and total assets versus net profit margin.



а) **б)**

Fig. 4. Relationships between total assets and net profit (a), and between total assets and net profit margin (b), among Ukrainian automotive dealerships in 2025

A moderate positive association was found between total assets and net profit (Pearson r = 0.631; Spearman ρ = 0.513; R^2 = 0.398). Firms with larger asset bases generally reported higher absolute net profits, although approximately 60% of the variation in net profit remains unexplained by the simple linear specification. The dispersion suggests the relevance of factors beyond asset size, including the mix of vehicle sales, service activities, cost management and financing arrangements. Evaluating these explanations requires additional data.

The relationship between total assets and net profit margin was negligible (Pearson r = 0.103; Spearman ρ = −0.038; R^2 = 0.011). Unlike absolute profit, relative sales profitability did not increase systematically with the reported asset base. Comparing the two panels reveals a fundamental distinction between the scale of resources and the efficiency with which sales revenue is converted into net earnings. This supports assessing efficiency through multiple indicators instead of ranking companies by assets or absolute profits.

Figure 4 therefore complements the index–matrix typology with a diagnostic comparison external to the construction of the indices. It contrasts asset scale with two measures of performance and illustrates why absolute net profit cannot substitute for a set of relative efficiency indicators. The moderate association between assets and profit, together with an almost nonexistent relationship between assets and net profit margin, is consistent with the logic of composite index (E), which incorporates margin and resource-productivity measures. These bivariate correlations do not independently validate the complete matrix or the resilience index (R); their role is to explain the economic rationale for the multidimensional approach.

DISCUSSION OF RESULTS AND PRACTICAL IMPLICATIONS

The findings advance understanding of performance in the automotive dealership sector under prolonged shocks. Increasing nominal revenue alongside relatively low median profit margins indicates that the scale of operations and financial performance should not be conflated.

The first practical implication is the need to monitor short-term economic efficiency and resilience to recurring disruptions separately. Current profitability reflects the results of a particular period but provides little information on reserve capacity, alternative supply channels, process-recovery times or human-capital resilience.

The second implication concerns quadrant-specific strategies. Operationally productive firms with lower resilience may benefit from scenario-based budgeting and reserves of critical resources, whereas resilience-oriented firms should examine measures to improve operating margins and asset turnover. Such recommendations require further internal diagnostics.

The typology can also be interpreted in the context of the business climate during the war. Security, energy, logistics, workforce and financing constraints create shared sectoral challenges, yet financial trajectories remain heterogeneous. The four matrix groups represent different combinations of measured efficiency and financial-outcome stability against this background. They cannot be interpreted as a direct index of business-climate quality or as evidence of the causal effects of particular external factors. Such analysis would require the financial panel to be combined with independently measured regional and institutional indicators.

CONCLUSIONS

This study develops and empirically applies a two-criteria index–matrix model for the comparative assessment of economic efficiency and financial–economic resilience under wartime conditions. The framework integrates two economically distinct dimensions: current returns to resource utilisation, represented by net profit margin, revenue per employee and approximate asset turnover; and the intertemporal stability of financial outcomes, represented by minimum revenue growth, inversely ranked growth variability and the recurrence of profitable years. Percentile normalisation provides comparability across indicators measured in different units, while median-based thresholds offer a transparent procedure for assigning firms to diagnostic groups.

Applying the framework to a balanced panel of 25 Ukrainian automotive dealerships for 2022–2025 yielded four categories: strategically balanced (8 firms), resilience-oriented (5 firms), operationally productive (6 firms) and critically vulnerable (6 firms). The weak, statistically insignificant rank correlation between E and R ($\rho = 0.220$; $p = 0.290$) warrants separate analytical interpretation of the two indices. Median nominal revenue rose from UAH 239.79 million to UAH 533.94 million, while median net profit margins remained modest and fluctuated over time. Growth in monetary turnover should therefore not be equated with improving economic efficiency. Additional correlation analysis revealed distinct patterns for absolute and relative financial results. Total assets were moderately associated with net profit but were virtually unrelated to net profit margin.

The principal scientific contribution consequently combines a transparent four-group diagnostic typology with empirical justification for separating business scale, current efficiency and financial-outcome stability. Sensitivity analysis nevertheless showed that alternative weights preserved group membership for only 16 of 25 firms. Matrix positions should therefore be interpreted as relative diagnostic outcomes.

The framework's practical value lies in differentiating areas for managerial attention: maintaining performance and reserves in strategically balanced firms; increasing resource productivity in resilience-oriented firms; strengthening continuity planning and risk diversification in operationally productive firms; and conducting comprehensive financial diagnostics in critically vulnerable firms. The typology captures heterogeneous corporate outcomes against an adverse wartime business climate but does not quantify its causal influence. Further research should deflate nominal financial measures, validate figures against original financial statements, expand the panel, assess sensitivity to weighting and cut-offs, and incorporate independent measures of regional risks, digital transformation and resource efficiency.

REFERENCES:

1. Deloitte & American Chamber of Commerce in Ukraine. (2026, March). Ensuring business resilience in Ukraine: Survey results [Report]. https://chamber.ua/wp-content/uploads/2026/03/ACC-Deloitte_Ensuring-business-resilience-in-Ukraine_ENG.pdf
2. European Business Association. (2026). Four years of full-scale war: How business in Ukraine is operating [Survey]. https://eba.com.ua/en/chotyry-roky-velykoyi-vijny-yak-pratsyuye-biznes-v-ukrayini/
3. Kuziakiv, O., Anhel, Y., Fedets, I., Gulik, A., & Shapovalova, D. (2026). New monthly enterprises survey No. 53: September 2026 [Brief]. Institute for Economic Research and Policy Consulting. https://ier.am.com.ua/en/product/new-monthly-enterprises-survey-53-september-2026-abridged/
4. United Nations Development Programme. (2026). Assessment of the impact of the war on micro, small, and medium-sized enterprises in Ukraine [Report]. https://www.undp.org/ukraine/publications/assessment-impact-of-war-on-micro-small-and-medium-sized-enterprises-in-ukraine
5. Opatska, S., Johansen, W., & Gordon, A. V. (2024). Business crisis management in wartime: Insights from Ukraine. Journal of Contingencies and Crisis Management, 32(1), e12513. https://doi.org/10.1111/1468-5973.12513
6. Dligach, A., & Stavytskyy, A. (2024). Resilience factors of Ukrainian micro, small, and medium-sized business. Economies, 12(12), 319. https://doi.org/10.3390/economies12120319

7. de Waal, G. A., Kenworthy, A. L., Opatska, S., Trevoho, O., Boychuk, Y., & Kozlova, V. (2025). Exposing pathways to organisational resilience: Revenue recovery patterns among Ukrainian firms in a war economy. Journal of Contingencies and Crisis Management, 33, e70058. https://doi.org/10.1111/1468-5973.70058
8. Shcherbak, V., Dorokhov, O., Dorokhova, L., Vzhytynska, K., Yatsenko, V., & Yermolenko, O. (2026). Financial risk management and resilience of small enterprises amid the wartime crisis. Journal of Risk and Financial Management, 19(1), 37. https://doi.org/10.3390/jrfm19010037
9. Sytailo, U. (2024). Business continuity in Ukraine: Challenges and opportunities in wartime [In Ukrainian]. Economy and Society, (62). https://doi.org/10.32782/2524-0072/2024-62-22
10. Browder, R. E., Dwyer, S. M., & Koch, H. (2024). Upgrading adaptation: How digital transformation promotes organizational resilience. Strategic Entrepreneurship Journal, 18(1), 128–164. https://doi.org/10.1002/sej.1483
11. Khurana, I., Dutta, D. K., & Ghura, A. S. (2022). SMEs and digital transformation during a crisis: The emergence of resilience as a second-order dynamic capability in an entrepreneurial ecosystem. Journal of Business Research, 150, 623–641. https://doi.org/10.1016/j.jbusres.2022.06.048
12. Ozorovych, A., & Matsola, M. (2026). Digital transformation management of SMEs in Ukraine under martial law. Management and Entrepreneurship: Trends of Development, 1(35), 148–161. https://doi.org/10.26661/2522-1566/2026-1/35-10
13. Bilyk, T., & Maksymova, I. (2026). Resilience, security, competitiveness: Conceptual guidelines for business development amid the green-digital transition [In Ukrainian]. Sustainable Development of Economy, 6(57), 644–652. https://doi.org/10.32782/2308-1988/2025-57-89
14. Maksymova, I., & Kurilyak, V. (2024). Digitalization and decarbonization: Aspects of synergy in the EU industries [In Ukrainian]. Economy and Society, (67). https://doi.org/10.32782/2524-0072/2024-67-157
15. Organisation for Economic Co-operation and Development. (2024). Enhancing resilience by boosting digital business transformation in Ukraine. OECD Publishing. https://doi.org/10.1787/4b13b0bb-en
16. Reznikov, R. (2026). Economic efficiency of a digital development strategy under a wartime crisis [In Ukrainian]. Modeling the Development of the Economic Systems, (3), 47–52. https://doi.org/10.31891/mdes/2026-21-6
17. Czajkowski, T., & Sikora, V. (2026). E-commerce transformation under wartime conditions: Evidence from Ukraine's digital economy. Journal of Finance and Financial Law, 2(50), 87–101. https://doi.org/10.18778/2391-6478.2.50.05
18. Bila, I., & Iliukhina, V. (2024). War economy in Ukraine: Consequences and possible competitive advantages in the post-war period [In Ukrainian]. Economy and Society, (59). https://doi.org/10.32782/2524-0072/2024-59-160
19. Liu, Y., & Hu, R. (2025). Artificial intelligence, supply chain finance, and corporate investment efficiency. Finance Research Letters, 85, 107851. https://doi.org/10.1016/j.frl.2025.107851
20. Keleş, E. (2023). Stock market response to the Russia–Ukraine war: Evidence from an emerging market. Journal of East-West Business, 29(3), 307–322. https://doi.org/10.1080/10669868.2023.2210121
21. Maistro, R. H., & Biletskyi, S. M. (2024). Efficiency of entities operating in the car service and automotive market in Ukraine under martial law [In Ukrainian]. Bulletin of the National Technical University "KhPI" (Economic Sciences), (6), 28–32. https://doi.org/10.20998/2519-4461.2024.6.28
22. Mastepan, S. M. (2024). Evaluation of the effectiveness of the development of the production potential of a car service enterprise [In Ukrainian]. Avtoshliakhovyk Ukrainy, (3), 45–49. https://doi.org/10.33868/0365-8392-2024-3-280-45-49
23. Polchanov, A. Yu., Vyhovska, N. H., Valinkevych, N. V., Lytvynchuk, I. V., & Diachok, S. M. (2026). Financial performance of Ukrainian enterprises during the war. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (1), 175–183. https://doi.org/10.33271/nvngu/2026-1/175
24. Opendatabot. (2026). Public company financial information and annual financial reporting data for sampled Ukrainian automotive dealerships [Dataset]. https://opendatabot.ua/

МОДЕЛЮВАННЯ ЕКОНОМІЧНОЇ ЕФЕКТИВНОСТІ ТА СТІЙКОСТІ БІЗНЕСУ В УМОВАХ ПОВНОМАСШТАБНОЇ ВІЙНИ

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У статті досліджено особливості оцінювання економічної ефективності та фінансово-економічної стійкості бізнесу в умовах повномасштабної війни. Проаналізовано особливості функціонування автомобільного бізнесу за трансформації бізнес-клімату, посилення безпекових загроз, нестабільності попиту та ресурсних витрат. Обґрунтовано необхідність розмежування поточної результативності використання ресурсів і здатності підприємств підтримувати стабільність фінансових результатів у часі. Сформовано збалансовану панель із 25 діючих автодилерських підприємств різних регіонів України, які провадили діяльність упродовж усіх досліджуваних років повномасштабної війни (2022–2025). На основі відкритої фінансової звітності проаналізовано динаміку доходів, прибутковості та ресурсовіддачі. Запропоновано авторську двокритеріальну модель оцінювання, що поєднує розроблені композитні індекси економічної ефективності та фінансово-економічної стійкості. Індекси сформовано за показниками рентабельності продажів, доходу на працівника, оборотності активів, динаміки та мінливості доходів і стійкості фінансових результатів. На основі співвідношення композитних індексів побудовано матрицю позиціонування підприємств. За результатами Визначено чотири типи бізнесу: стратегічно збалансовані, резильентно орієнтовані, операційно результативні та критично вразливі. За результатами моделювання встановлено неоднорідність взаємозв'язку окремих складових оцінювання ефективності та резильєнтності бізнесу, а також розбіжності між масштабом активів, прибутком і рентабельністю продажів. Розкрито особливості кожного типу та визначено відповідні управлінські пріоритети, зокрема: підтримка рівня ефективності та резервів у стратегічно збалансованих компаніях; підвищення продуктивності; посилення планування безперервності діяльності та диверсифікації ризиків. Обґрунтовано застосування матриці для порівняльної діагностики підприємств з урахуванням відносного характеру класифікації та її чутливості до методичних припущень.

Ключові слова: економічна ефективність, стійкість, бізнес-аналіз, автосалони, комплексний індекс, економіка воєнного часу, матрична модель, бізнес-клімат.