ANALYTICAL PROCEDURES IN AUDIT AS A TOOL FOR PREDICTING THE RISKS OF FINANCIAL STATEMENT FRAUD IN MARKETING COMPANIES

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ABSTRACT

This study investigates the detection of financial reporting manipulation in Ukrainian marketing companies during 2023–2024 by applying the Beneish and Roxas models as part of analytical audit procedures. The research highlights the industry-specific characteristics of the sector, particularly its low reliance on fixed assets and long-term liabilities, which simplifies operational structuring but may also increase susceptibility to financial misrepresentation. Through empirical analysis of a sample of 50 marketing firms, the study identifies potential financial manipulation by examining deviations in key indicators. A comparative assessment of the Beneish and Roxas models reveals discrepancies in their predictive outcomes, suggesting methodological differences in fraud detection. The findings indicate an elevated risk of financial statement manipulation within the Ukrainian marketing sector, exacerbated by the economic instability of martial law. The Beneish model demonstrates superior diagnostic capability due to its comprehensive integration of income, expense, asset, and liability interdependencies.

The study contributes to the literature on forensic accounting by validating the applicability of these models in emerging markets under crisis conditions and provides practical insights for auditors and regulators in enhancing financial oversight.

Key words: financial reporting fraud, Beneish model, Roxas model, audit analytics, marketing companies, Ukraine.

JEL Classification: G32, G34, L84, M42.

INTRODUCTION

Audit confirmation of financial statements does not guarantee the complete absence of fraud and manipulation in the reflection of assets, liabilities, financial results, and cash flows. International practice demonstrates numerous cases when companies whose reporting received a positive audit opinion soon after went bankrupt or showed signs of financial fraud.

One of the most resonant and widely cited examples is the collapse of the Enron Corporation in 2001. Despite receiving a positive audit opinion from Arthur Andersen, the company concealed billions of dollars in losses through complex financial schemes. Such cases emphasize the critical need to improve methods for detecting fraud risks in financial reporting.

Despite substantial regulatory reforms and the implementation of stricter legislation in financial accounting and auditing for public corporations - intended to enhance transparency, strengthen control and prevent fraud - the issue of financial statement falsification remains unresolved (Erdoğan and Erdoğan, 2020). Earnings manipulation continues to be a widely studied phenomenon among both academic researchers and industry professionals (Svabova et al., 2020). A notable example is the 2018 high-profile bankruptcy of the British construction company *Carillion,* which attracted significant scrutiny not only toward the company itself, but also toward its external auditor - the international audit firm *KPMG*, as well as *Deloitte PPL*, which provided outsourcing services to *KPMG*. This situation is particularly concerning given that the audit firms were involved in preparing Carillion's long-term development report, which asserted the absence of any risks to the company's future performance. In light of such cases, scholars emphasize the urgent need to develop tools that enhance the current accounting and auditing framework in order to restore trust in the profession and ensure its alignment with the public interest (Alkaraan et al., 2024). It will allow eliminating such features of financial reporting that are frequently described - both in academic discourse and in public opinion - as fraudulent, manipulated, or misleading.

One of the ways to enhance audit quality, particularly in terms of reducing the risks of undetected fraud, is to develop analytical procedures that incorporate modern tools for preliminary risk analysis (Repousis, 2016; Aqilah, Mohammed and Kamaluddin, 2021). These tools enable auditors to efficiently identify companies exhibiting potential indicators of fraud by focusing on key financial metrics. Among the most common models for assessing the reliability of financial statements are the Beneish and Roxas models, which are cost-effective, relatively easy to implement and can support auditors in detecting manipulations and falsifications in corporate financial reporting (Golec, 2019; Lehenchuk et al., 2022).

Despite the ongoing martial law in Ukraine, entrepreneurial activity continues, but it acquires new organizational and legal forms, alternative financial sources, diversified risk management strategies, and innovative approaches to work organization. Marketing companies play a crucial role in the functioning of the Ukraine's economic system, acting as intermediaries between producers and consumers, shaping demand for goods and services, and supporting the effective operation of market mechanisms. Their activities contribute to the development of competition, the innovative renewal of the economy, and the enhancement of product and service quality.

Marketing companies possess specific characteristics that increase their vulnerability to financial fraud risks. These include creation of intangible assets and intellectual property, a complex asset structure with a significant proportion of goodwill and accounts receivable, as well as revenue recognition practices related to services rendered over extended periods. These factors create the prerequisites for the manipulation of financial statements and require increased attention from auditors when assessing risks. Therefore, systematic monitoring of the financial statements of marketing companies using analytical procedures will contribute to increasing the transparency and reliability of financial indicators for investors and creditors.

LITERATURE REVIEW

The first attempts to improve audit methodology through the application of analytical procedures emerged in the late 1990s. In particular, Beneish (1999) developed a quantitative model (Beneish M-Score), which enabled the detection of financial statement manipulation based on the analysis of key financial ratios. Afterwards Roxas (2011), who reduced the number of variables, thereby improving its accuracy when applied to smaller companies, refined this model. In addition, researchers have also developed a number of other similar regression models, such as Montier C Score (2009), Dechow F Score (2011), Pustylnick P-Score (2011), which are commonly used to identify hidden or atypical patterns that may signal the potential for financial statement fraud.

Recent advancements in digitalization and AI-driven analytics have further expanded methodological tools. Machine learning (Achakzai & Peng, 2023), artificial neural networks (Omar et al., 2017), and data mining techniques (Ravisankar et al., 2010) now enable more sophisticated detection of non-linear relationships and hidden fraud signals. Despite these innovations, the Beneish and Roxas models remain widely adopted in auditing practice due to their interpretability and empirical robustness.

Nowadays, the Beneish and Roxas models are among the most widely employed by researchers to enhance analytical procedures in auditing, particularly for assessing the reliability of financial reporting indicators across various industries and countries. Thus, Repousis (2016) studied the activities of 25468 Greek companies for 2011-2012 and found that 33 percent of the sample had a signal that companies are likely to be manipulators. Erdoğan and Erdoğan (2020) applied the Beneish model to companies listed on Borsa İstanbul-50 (BIST-50) for 2015-2017, and found a positive relationship between the probability of manipulating financial information and the regressors of the model, AQI and SGAI.

Lehenchuk et al. (2021), using the Beneish and Roxas models, studied the activities of 30 leading Ukrainian corporations for the period 2017-2018. Their findings confirmed the reliability of financial statements for 10 corporations, while potential manipulations were identified in 11 cases. Sankar and Bhanawat (2024) analyzed the financial statements of Indian corporations for the period 2011-2016 and found that the Days' Sales in Receivables Index (DSRI), Total Accruals to Total Assets (TATA) and Sales Growth Index (SGI) indicators were effective in identifying companies involved in financial statement manipulations.

Ozkan and Alfarhan (2025) analyzed 9,766 non-financial firms across G7 countries over the period 2006-2022, identifying earnings manipulators using the Beneish M-Score Model. The authors also conducted cross-country analyses, which revealed common manipulative practices prevalent among firms in G7 countries. In addition to large-scale empirical studies, researchers also apply the Beneish M-Score Model in case study analyses focused on individual companies. Thus, Ramírez-Orellana et al. (2017) found, using the Beneish model, detected tendencies towards fraud and earnings management in the Spanish company *Pescanova*, specifically through the manipulation of the DSRI and TATA indicators. Similarly, Hariri, Pradana and Widjajanti (2017) identified potential financial manipulations in the Indonesian company *XYZ, PT* during the years 2010, 2012, and 2013.

Some researchers have sought to evaluate the effectiveness of the Beneish and Roxas models by comparing their predictive results with other indicators that determine the presence of fraudulent financial reporting. Thus, Svabova et al. (2020) compared the outcomes of the Beneish model with real data from 1,900 Slovak companies identified as manipulative during the period 2009-2018.

Their analysis revealed a match of 32.7% for fraudulent companies and 38.4% for companies that did not commit fraud. Shakouri et al. (2021) examined the indicators of 161 companies listed on the Tehran Stock Exchange over the same period and found that the Beneish model was able to distinguish between fraudulent and non-fraudulent companies with 73% accuracy. Similarly, Golec (2019) in a study of 24 Polish firms listed on the Warsaw Stock Exchange reported that the Beneish M-Score achieved an accuracy rate ranging from 71% to 75%. Using the Beneish and Roxas model, Sylwestrzak (2022) examined 63 non-financial Polish companies listed on the Warsaw Stock Exchange over the period 2010-2021. Based on the analysis, the author developed and tested a hybrid model that demonstrated the importance of incorporating both financial and non-financial indicators, along with logistic regression techniques, to improve the accuracy of detecting financial statement fraud. Thus, a review of the scholarly literature confirms that the Beneish and Roxas models are sufficiently effective tools for identifying companies engaged in financial statement falsification and manipulation. Their application is therefore appropriate and valuable in enhancing analytical procedures within the audit process. The purpose of this article is to identify signals of financial statement falsification among Ukrainian marketing companies as part of analytical procedures in auditing, using of the Beneish and Roxas models.

METHODS

The study is based on the use of Beneish (Beneish M-Score) (1999) and Roxas (Roxas Score) (2011) models for atypical correlation between financial reporting indicators and forecasting the risks of its falsification. Their general characteristics and calculation procedure are given in Table 01.

The application of these models (Table 01) within the audit process enables preliminary risk assessment, particularly by facilitating the prompt identification of companies exhibiting potential signs of financial fraud. This is achieved through the analysis of key financial indicators such as revenue trends, asset quality, and cash flow performance.

Using the Beneish and Roxas models, an empirical analysis was conducted on 50 Ukrainian marketing companies for the period 2023–2024. The results allowed for the identification of companies falling within the high-risk category - i.e., those with a potential likelihood of financial statement manipulation, as well as those whose financial reporting demonstrated a high level of reliability.

Table 1. Characteristics of Beneish and Roxas models

Characteristic	*Beneish M-Score*	*Roxas M-Score*
Method	Linear regression	Logistic regression
Regressors	DSRI – Days' Sales in Receivables Index	DSRI – Days' Sales in Receivables Index
	GMI – Gross Margin Index	GMI – Gross Margin Index
	AQI – Asset Quality Index	AQI – Asset Quality Index
	SGI – Sales Growth Index	SGI – Sales Growth Index
	DEPI – Depreciation Index	DEPI – Depreciation Index
	SGAI – Selling, General & Admin Expenses Index	
	TATA – Total Accruals to Total Assets	
	LVGI – Leverage Index	
Model formula	M-Score (Beneish)=-4,84+0,920* DSRI +0,528*GMI+0,404*AQI+0,892*SGI + 0,115*DEPI–0,172*SGAI+4,679*TA TA – 0,327*LVGI	M-Score (Roxas) = -6,065 + 0,823*DSRI + 0,906*GMI + 0,593*AQI + 0,717*SGI + 0,107*DEPI
Manipulation thresholds	M-Score > -2.22 (higher probability of financial reporting manipulation); M-Score ≤ -2.22 (lower risk).	M-Score > -2.76 (higher probability of financial reporting manipulation); M-Score ≤ -2.76 (lower risk).
Sensitivity level	High for all financial statement manipulations	High for financial statement manipulations of small companies

Source: Compiled by the authors based on Beneish (1999) and Roxas (2011)

The information base for the study consisted of the financial statements of companies that are regional leaders in terms of revenue in Ukraine. In the process of forming a sample, a diverse structure of assets and liabilities among the selected companies was identified. Some firms reported zero non-current assets and receivables on their balance sheets, and the composition of financing sources varied significantly, with differing proportions of equity and borrowed capital. Notably, despite the ongoing martial law in Ukraine, many small marketing companies have maintained a high level of financial stability, and a substantial share of them operate without the use of long-term liabilities.

Taking into account the industry-specific features of the financial condition of marketing companies under martial law, a sample of 50 companies was selected for analysis. If we consider by individual economic activity categories (National classification of economic activities - NCEA), then for NCEA 73.11 "Advertising agencies" - 41 companies (82%), NCEA 73.12 "Mediation in advertising placement in the mass media" - 7 companies (14%), and for NCEA 73.20 "Market research and public opinion polling" - 2 companies (4%).

An analysis of the dependence on external sources of financing revealed that the vast majority of companies in the sample – 39 out of 50 (78%) – are sufficiently financed through equity and current liabilities, with no recorded long-term liabilities.

Fig. 01 presents the geographical distribution of the studied marketing companies, serving as basis for assessing the reliability of their financial reporting indicators.

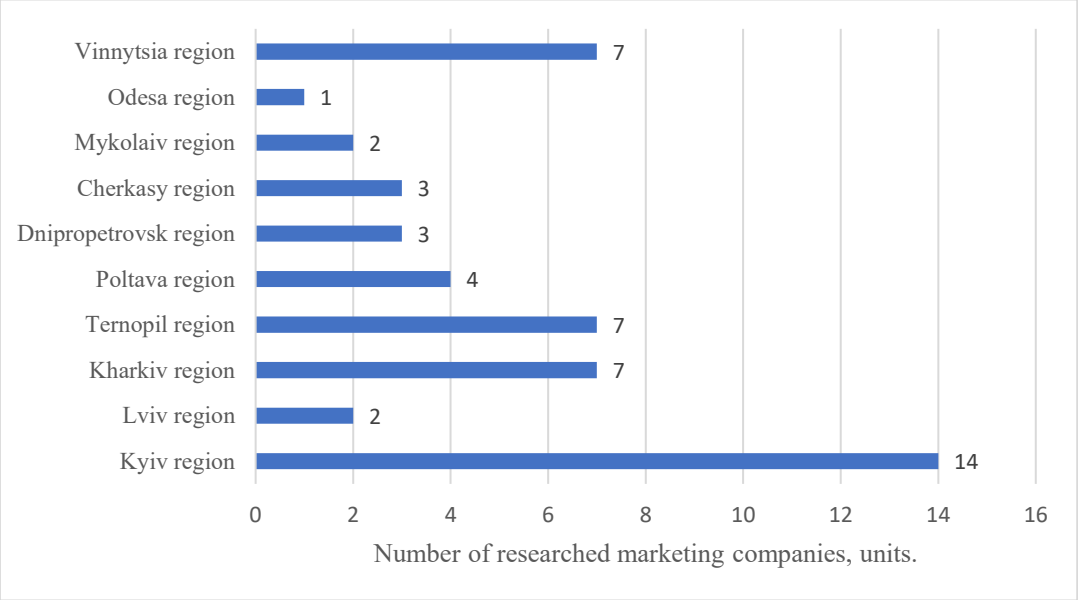

Fig. 1. Geographical distribution of the sampled marketing companies in the regions of Ukraine

Source: Compiled by the authors

The highest concentration of companies in the sample was registered in the Kyiv region, accounting for 14 out of 50 or 28%. In terms of organizational and legal form, the majority - 44 companies (88%) – are limited liability companies, while the remaining 6 (12%) are private companies. The selected companies utilize fixed assets in their business operations, work with clients of varying solvency, and often carry forward a portion of current accounts payable from the previous reporting period. They generally adhere to the accrual and matching principles in the recognition of income and expenses, report defined financial results, and reflect revenues and expenses from sales activities for 2023-2024 period in their financial statements.

RESULTS

Based on the published financial statements of Ukrainian marketing companies for 2023-2024, eight financial indicators were calculated in accordance with the Beneish M-Score and Roxas M-Score models – namely, DSRI, GMI, AQI, SQI, DEPI, SGAI, TATA, LVGI (Appendix A). The analysis of these indicators enables the identification of companies, exhibiting potential signs of financial manipulation and elevated risk levels. The most concerning findings relate to companies with extreme values of TATA and GMI, which may indicate aggressive accounting practices and reduced cost efficiency, respectively. stable companies demonstrate indicators close to the regulatory ones.

DSRI and GMI exhibit substantial variability across the sample. For example, GMI ranges from -5.54 to 233.39, reflecting significant differences in gross margin dynamics and cost management. Similarly, LVGI ranges from 0.14 to 6.40, highlighting different levels of debt burden among firms. Certain companies display extreme values across multiple indicators, which may suggest financial instability or non-standard operating conditions under martial law. TATA deviates significantly from the norm in many companies, which may indicate an aggressive accounting policy. Companies with indicators' value close to one tend to demonstrate greater financial stability and more reliable reporting.

Analysis of the range of DSRI values revealed that DSRI is greater than 1 may indicate a potential overstatement of revenue from product sales, whereas a value below 0.5 may suggest the artificial understatement of revenue, likely due to its allocation across different reporting periods. Similarly, the variation in GMI values indicates that a GMI above 3 reflects a sharp decline in profitability, which may be a sign of business problems or financial statement manipulation. Conversely, a GMI below 0 may point to unprofitability or non-standard accounting practices used at companies.

In terms of TATA, values exceeding 1 suggest a high proportion of non-cash components in reported profit, confirming the possibility of manipulation. In contrast, TATA values below 0 imply the use of conservative accounting practices. The analysis of the range of LVGI values shows that when LVGI exceeds 2, it suggest a high level of financial leverage, which increases a company's financial risks. Value below 0.5 may indicates excessive capitalization or a strategy of avoiding debt financing.

The analysis made it possible to identify several companies (*Lati Production* LLC, *Flatfy UA* LLC, *Partner Media* LLC, *OMG Agency* LLC) that have the highest risks of financial reporting fraud. These companies exhibit significantly elevated or abnormally high GMI values, which indicate potential errors in financial reporting or the artificial understatement of profits. Additionally, their high TATA values confirm possible financial manipulations in these companies. The overall results of the M-Score calculations, based on both the 5-factor Roxas model and the 8-factor Beneish model, are given in Appendix B. According to the Beneish model, an M-Score value exceeding 1.5 signals a high risk of manipulation. For instance, *Lati Production* LLC recorded an extreme M-Score of 2328.21, while *Partner Media* LLC reported a value of 281.93. Results from the Roxas model (5-factor) similarly confirm these risk levels. The most concerning cases are *Lati Production* LLC, *G. O. Media* LLC, and *Afisha Print* LLC, all of which have abnormally high M-Scores. These findings suggest a need for further in-depth examination of their financial statements by the audit professionals.

Appendix C presents a summary of the consistency and divergence in M-Score calculations based on the Beneish and Roxas models, allowing for a comparative interpretation of results for the 50 marketing companies analyzed for the period 2023–2024.

The analysis reveals that only three companies show consistent outcomes across both models, confirming the reliability of their financial statements and the absence of manipulative practices. The overall results of the assessment of financial statement reliability for the 50 marketing companies, as determined by the Roxas and Beneish models, are illustrated in Fig. 02.

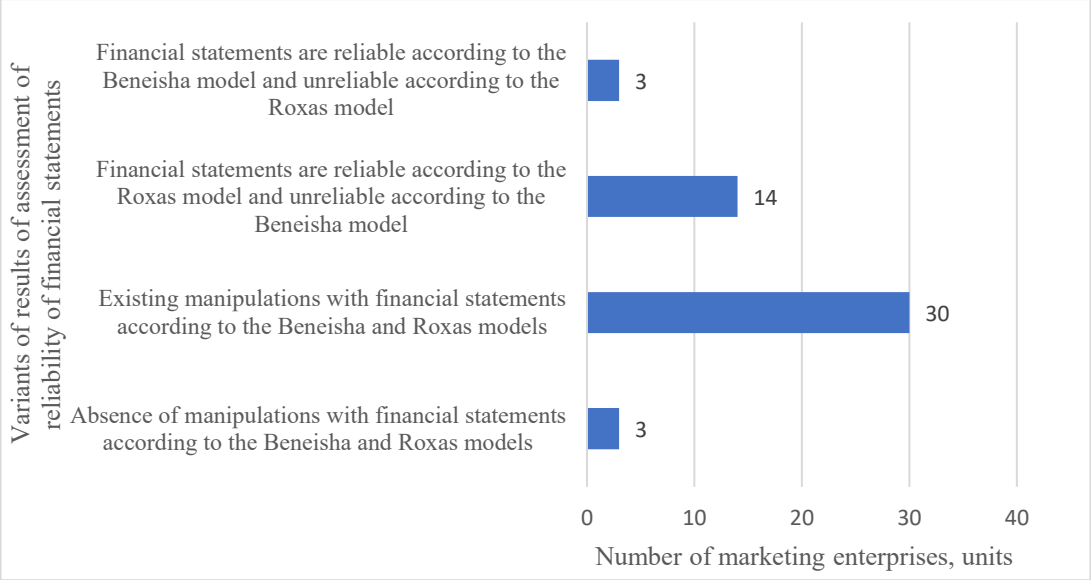

Fig. 02. Results of applying the Roxas and Beneish Models to assess the reliability of marketing companies' financial statements (2023–2024)
Source: Compiled by the authors

The analysis shows that in 60% of the studied marketing companies, either model did not confirm the reliability of financial reporting. For 28% of the companies, reliability was confirmed only according to the Roxas model, and for 6% - only according to the Beneish model. Only 6% of the companies demonstrated consistent results across both models, confirming the reliability of their financial statements. These findings indicate a higher incidence of potential financial reporting manipulation among marketing companies compared to the results reported by Repousis (2016) and Lehenchuk et al. (2021), thereby highlighting an elevated level of financial abuse directly in the marketing sector. This underscores the urgent need to develop and implement tools aimed at minimizing such practices.

Researchers seeking to build upon the findings of this study should consider several limitations. First, the sample was limited to 50 of the largest marketing companies in Ukraine; expanding the sample could yield more comprehensive and generalizable conclusions. Second, while the Beneish and Roxas models were used to identify financial reporting manipulation risks for marketing companies, alternative approaches, such as Benford's Law, could provide more detailed results regarding critical cases of manipulation.

Third, for a more detailed analysis of the identified discrepancies between the Beneish and Roxas models, complementary analytical procedures, such as cash flow analysis, should be conducted to enhance the precision of the results. Fourthly, since the object of the study was marketing companies that have a limited need for fixed assets and long-term liabilities, industry adjustments can be made to the coefficients of the model regressors to obtain more accurate results. Fourth, as the study focused on marketing companies – an industry generally characterized by limited dependence on fixed assets and long-term liabilities –adjusting the regression coefficients of the models to reflect industry-specific characteristics may enhance their predictive accuracy and applicability within this sector.

CONCLUSION

In examining the effectiveness of analytical procedures in auditing as a tool for predicting the risks of financial statement falsification among marketing companies, it was observed that such companies do not necessarily require fixed assets and long-term liabilities to conduct their economic activities. This structural characteristic simplifies the organization and operation of marketing firms. The analyzed sample includes 50 marketing companies classified under NCEA codes 73.11, 73.12, and 73.20, representing businesses from 10 regions across Ukraine (Vinnytsia, Dnipro, Kyiv, Lviv, Mykolaiv, Odessa, Poltava, Ternopil, Kharkiv, Cherkasy regions).

The reliability analysis conducted using the Beneish and Roxas models enables the detection of both the presence or absence of financial statement manipulations, and the identification of specific problematic indicators within individual companies (for example, high TATA, GMI), which may signal financial risks or manipulative practices. The Beneish model, in particular, provides more comprehensive results due to its broader consideration of interrelationships among income, expenses, assets and liabilities. Companies with extreme values according to the Beneish model should be prioritized for further audit examination.

Practical application of the Beneish and Roxas models simultaneously to identify signs of financial statement falsification among 50 marketing Ukrainian companies for the period 2023-2024 revealed four distinct patterns of concordance and divergence in the assessment results. The comparison of actual and threshold M-Score values across both models enabled a more accurate confirmation of the reliability of financial statements for 3 companies (6% of the sample), and identified potential manipulations in 30 companies (60%). These findings indicate a high level of risk related to financial statement manipulation within the marketing sector. Discrepancies between the models were found in 17 companies; in particular, in 14 cases manipulation was detected exclusively by the Beneish model, while in 3 cases only the Roxas model indicated the presence of potential manipulations.

Based on the conducted research, the following recommendations can be formulated for different groups of stakeholders. Audit entities should conduct an in-depth audit of marketing companies with extreme Beneish M-Score values or a high probability of manipulation, determined based on the Roxas M-Score. Since 60% of the studied sample have a high level of risk, it is necessary to improve audit procedures by detailed verification of contracts with customers for payment terms, analysis of the correlation between revenue and cash flows, and assessment of the reasonableness of marketing expenses. Capital borrowers are recommended to generally avoid interaction with marketing companies that have a high risk of manipulation, confirmed simultaneously by the Beneish M-Score and the Roxas M-Score. Management of marketing companies with a high level of potential financial statement manipulation should regularly monitor indicators that indicate manipulation. In particular, avoid unjustified payment delays, reduce the share of accruals in profit, and control a high level (more than 5% of the value of assets) of cash flows from transactions.

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Appendix A

Estimated indicators for the Beneish M-Score and Roxas M-Score for 2023-2024

No	*Companies*	*Indicators based on the results of financial reporting 2023-2024*							
		DSRI	*GMI*	*AQI*	*SQI*	*DEPI*	*SGAI*	*TATA*	*LVGI*
1	LLC "EMARKET UKRAINE"	0.79	1.03	0.98	1.38	0.84	0.87	0.80	1.05
2	LLC "GOOGLE"	1.39	1.13	-0.05	1.05	0.96	1.00	0.51	6.40
3	LLC "TIBIW'WAY UKRAINE"	0.70	4.34	0.60	1.97	1.76	2.18	0.55	0.89
4	LLC "ADVERTISING AGENCY"AI TI"	0.90	24.90	0.84	1.38	1.20	0.81	0.02	1.07
5	LLC "MEDIACOM UKRAINE"	1.04	-2.29	0.22	1.68	7.60	0.40	0.07	1.16
6	LLC "HAVAS ENGAGE UKRAINE"	0.76	15.57	1.09	1.43	1.17	1.21	0.06	1.06
7	PP "CENTER OF MEDICAL AND PHARMACEUTICAL INFORMATION "MEDICAL DATA MANAGEMENT"	1.05	1.16	0.62	1.43	1.36	0.67	0.12	1.11
8	LLC "STAR UP PLUS"	1.92	5.79	0.02	1.20	2.07	4.03	2.12	0.33
9	LLC "ROBOTA INTERNATIONAL"	0.56	2.57	0.59	1.58	1.14	1.03	-0.01	1.38
10	LLC "PROMOLIGHT"	0.61	2.83	1.13	1.78	8.92	0.90	3.76	0.78
11	LLC "MEGA - POLIS - PLUS"	0.81	1.28	1.11	1.86	1.68	1.00	-0.52	0.94
12	LLC "ELITE-TM"	0.64	3.78	0.74	2.33	1.13	0.92	0.19	0.95
13	LLC "TECHNOSTAR GROUP"	0.89	3.25	0.73	1.73	0.46	1.08	6.02	0.92
14	LLC "BORDPROM"	1.92	0.01	0.95	0.48	1.20	0.10	0.70	1.09
15	LLC "ADVERTISING AGENCY HK"	0.37	1.35	0.85	2.32	0.47	0.42	3.55	0.96
16	LLC "OLTECH COMPANY"	0.17	0.85	3.94	2.43	1.00	0.71	0.67	0.81
17	"MEDIUM-TV" LLC	2.57	10.32	1.39	3.69	1.00	0.65	-0.46	0.95
18	"RA "MEGAPOLIS" LLC	0.67	4.03	1.03	1.52	1.00	1.79	8.49	1.00
19	"EDMIX DNIPRO" LLC	0.96	-5.54	1.80	1.66	0.16	1.00	-0.47	0.98
20	"DEMETRA CONSULTING BUREAU" LLC	0.37	5.87	3.07	2.12	1.60	1.31	1.84	1.01
21	"NATIV CREATIVE" LLC	0.54	0.72	0.97	1.53	1.02	1.79	1.28	0.69
22	"AVANTAIME" LLC	0.82	1.87	1.07	1.31	4.07	1.18	2.08	1.41
23	"AQUARIUM" ADVERTISING AGENCY" LLC	0.77	1.09	1.79	1.28	1.00	0.40	38.27	1.4
24	"EMK" LLC	0.82	0.88	1.17	0.94	1.63	1.00	0.05	0.98
25	"OMG AGENCY" LLC	0.11	33.80	2.47	5.81	1.32	1.69	3.75	0.83
26	"PHARM-VECTOR MARIA" LLC	1.23	1.40	1.29	0.83	1.34	8.71	1.32	0.70
27	"DALI" MARKETING CENTER" LLC	0.87	0.85	0.97	1.15	0.88	1.17	2.46	0.91
28	"PARTNER MEDIA" LLC	0.96	2.48	0.96	1.20	0.95	2.47	60.64	0.99
29	"KVV-D" LLC	0.70	2.75	0.91	2.03	1.24	0.67	3.35	1.49
30	"G. O. MEDIA"	0.31	0.60	1.10	1.28	6.51	-0.73	160.96	0.78
31	PP "VILNE ZHYTTYA"	1.43	-0.03	1.10	0.59	1.00	1.63	30.12	1.21
32	LLC "INTERNET-REKLAMA RIA"	0.24	2.03	1.24	1.41	0.85	0.37	-0.07	0.57
33	LLC "LOON UA"	0.96	1.15	1.01	0.73	1.00	2.14	7.57	0.88
34	LLC "ALL-SKY"	1.00	1.18	2.53	1.34	1.15	0.65	1.57	1.20
35	LLC "FLEETFAY UA"	0.26	233.39	1.28	2.62	0.16	5.02	56.31	0.14
36	LLC "POS - MASTER"	1.98	0.69	0.93	0.59	0.85	1.70	0.36	1.08
37	LLC "ADVERTISING AGENCY "SANNY"	0.84	0.66	1.3	1.33	1.00	0.37	1.51	1.47
38	LLC "ADVERTISING AGENCY" BASTION"	2.05	2.86	0.91	1.47	0.89	1.34	42.71	0.94
39	LLC "PRNEWS"	1.67	0.47	0.94	0.85	0.90	0.65	2.01	0.89
40	LLC "GROVEX MEDIA"	1.29	0.99	2.31	0.77	0.67	1.38	7.69	0.52
41	LLC "FLYROCK"	0.24	1.03	0.87	1.69	1.48	0.59	0.29	0.61
42	LLC "LATI WEB"	2.69	5.65	0.91	1.44	1.16	2.52	2.00	2.52
43	LLC "LATI PRODUCTION"	0.14	5.08	2.27	1.47	0.72	1.52	497.73	2.13
44	LLC "KOMERTS EVOLUTION"	1.01	13.13	0.86	1.38	1.07	6.92	2.55	0.52
45	LLC "POLIGRAPHYCH"	1.15	0.82	1.05	0.89	1.01	1.03	12.18	0.82
46	LLC "JOHN DEERE UKRAINE"	3.69	0.81	0.46	0.51	0.97	1.44	0.35	0.90
47	LLC "STARLIGHT MEDIA"	1.17	1.11	1.00	1.22	1.02	0.76	-0.01	0.98
48	LLC "AFISHA PRINT"	0.38	0.87	1.90	0.85	0.82	1.21	145.72	0.28
49	LLC "WAY AP"	1.77	0.51	2.07	0.66	2.23	1.18	1.42	0.86
50	"ADVERTISING AGENCY "BAGI - RA" LLC	0.21	1.00	-7.87	1.21	1.05	0.68	73.15	0.64

Source: Compiled by the authors

Appendix B

M-Score values according to the 5-factor Roxas model and the 8-factor Beneish model at companies for 2023-2024

No	Companies	M-Score value according to the 5-factor model Roxas	M-Score value according to the 8-factor model Beneish
1	LLC "EMARKET UKRAINE"	-2.82	1.38
2	LLC "GOOGLE"	-3.08	-1.81
3	LLC "TIBIW'WAY UKRAINE"	0.40	2.2
4	LLC "ADVERTISING AGENCY "AITI"	18.85	10.43
5	LLC "MEDIACOM UKRAINE"	-5.14	-2.74
6	LLC "HAVAS ENGAGE UKRAINE"	10.46	5.66
7	PP "CENTER OF MEDICAL AND PHARMACEUTICAL INFORMATION "MEDICAL DATA MANAGEMENT"	-2.61	-1.49
8	LLC "STAR UP PLUS"	1.85	10.43
9	LLC "ROBOTA INTERNATIONAL"	-1.66	-1.84
10	LLC "PROMOLIGHT"	-0.09	17.46
11	LLC "MEGA - POLIS - PLUS"	-2.07	-4.05
12	LLC "ELITE-TM"	0.13	0.66
13	LLC "TECHNOSTAR GROUP"	-0.67	27.25
14	LLC "BORDPROM"	-3.43	0.78
15	LLC "ADVERTISING AGENCY HK"	-2.32	14.92
16	LLC "OLTECH COMPANY"	-0.97	2.37
17	"MEDIUM-TV" LLC	8.98	4.35
18	"RA "MEGAPOLIS" LLC	-0.06	38.89
19	"EDMIX DNIPRO" LLC	-8.02	-7.34
20	"DEMETRA CONSULTING BUREAU" LLC	3.07	9.96
21	"NATIV CREATIVE" LLC	-3.19	3.34
22	"AVANTAIME" LLC	-1.69	8.06
23	"AQUARIUM" ADVERTISING AGENCY" LLC	-2.36	176.95
24	"EMK" LLC	-3.05	-2.40
25	"OMG AGENCY" LLC	30.42	36.43
26	"PHARM-VECTOR MARIA" LLC	-2.29	2.90
27	"DALI" MARKETING CENTER" LLC	-3.08	8.96
28	"PARTNER MEDIA" LLC	-1.49	281.93
29	"KVV-D" LLC	-0.88	14.63
30	"G. O. MEDIA"	-3.01	751.09
31	PP "VILNE ZHYTTYA"	-3.74	137.80
32	LLC "INTERNET-REKLAMA RIA"	-2.20	-2.28
33	LLC "LOON UA"	-2.99	32.59
34	LLC "ALL-SKY"	-1.58	5.92
35	LLC "FLEETFAY UA"	208.26	384.09
36	LLC "POS - MASTER"	-2.74	-0.60
37	LLC "ADVERTISING AGENCY "SANNY"	-2.94	4.63
38	LLC "ADVERTISING AGENCY" BASTION"	-0.10	199.65
39	LLC "PRNEWS"	-3.00	7.19
40	LLC "GROVEX MEDIA"	-2.11	34.13
41	LLC "FLYROCK"	-3.05	-1.00
42	LLC "LATI WEB"	2.97	10.50
43	LLC "LATI PRODUCTION"	1.14	2328.21
44	LLC "KOMERTS EVOLUTION"	8.28	15.27
45	LLC "POLIGRAPHYCH"	-3.01	54.54
46	LLC "JOHN DEERE UKRAINE"	-1.55	0.85
47	LLC "STARLIGHT MEDIA"	-2.52	-2.05
48	LLC "AFISHA PRINT"	-3.14	679.12
49	LLC "WAY AP"	-2.21	4.91
50	"ADVERTISING AGENCY "BAGI - RA" LL C	-8.67	335.86

Source: Compiled by the authors

Appendix C

M-Score coincidences and discrepancies according to the Beneish and Roxas models for 50 domestic marketing companies for 2023-2024

No	*Companies*	*Four variants of M-Score comparison results according to the Beneish and Roxas models*			
		M-score (B) < -2.22 and M-score (R) < -2.76	*M-score (B) > -2, 22 i M-score (R) > -2, 76*	*M-score (B) > -2, 22 i M-score (R) < -2, 76*	*M-score (B) < -2, 22 i M-score (R) > -2, 76*
1	LLC "EMARKET UKRAINE"	No	No	Yes	No
2	LLC "GOOGLE"	No	No	Yes	No
3	LLC "TIBIW'WAY UKRAINE"	No	Yes	No	No
4	LLC "ADVERTISING AGENCY "AITI"	No	Yes	No	No
5	LLC "MEDIACOM UKRAINE"	Yes	No	No	No
6	LLC "HAVAS ENGAGE UKRAINE"	No	Yes	No	No
7	PP "CENTER OF MEDICAL AND PHARMACEUTICAL INFORMATION "MEDICAL DATA MANAGEMENT"	No	Yes	No	No
8	LLC "STAR UP PLUS"	No	Yes	No	No
9	LLC "ROBOTA INTERNATIONAL"	No	Yes	No	No
10	LLC "PROMOLIGHT"	No	Yes	No	No
11	LLC "MEGA - POLIS - PLUS"	No	No	No	Yes
12	LLC "ELITE-TM"	No	Yes	No	No
13	LLC "TECHNOSTAR GROUP"	No	Yes	No	No
14	LLC "BORDPROM"	No	No	Yes	No
15	LLC "ADVERTISING AGENCY HK"	No	Yes	No	No
16	LLC "OLTECH COMPANY"	No	Yes	No	No
17	"MEDIUM-TV" LLC	No	Yes	No	No
18	"RA "MEGAPOLIS" LLC	No	Yes	No	No
19	"EDMIX DNIPRO" LLC	Yes	No	No	No
20	"DEMETRA CONSULTING BUREAU" LLC	No	Yes	No	No
21	"NATIV CREATIVE" LLC	No	No	Yes	No
22	"AVANTAIME" LLC	No	Yes	No	No
23	"AQUARIUM" ADVERTISING AGENCY" LLC	No	Yes	No	No
24	"EMK" LLC	Yes	No	No	No
25	"OMG AGENCY" LLC	No	Yes	No	No
26	"PHARM-VECTOR MARIA" LLC	No	No	No	Yes
27	"DALI" MARKETING CENTER" LLC	No	No	Yes	No
28	"PARTNER MEDIA" LLC	No	Yes	No	No
29	"KVV-D" LLC	No	Yes	No	No
30	"G. O. MEDIA"	No	No	Yes	No
31	PP "VILNE ZHYTTYA"	No	No	Yes	No
32	LLC "INTERNET-REKLAMA RIA"	No	No	No	Yes
33	LLC "LOON UA"	No	No	Yes	No
34	LLC "ALL-SKY"	No	Yes	No	No
35	LLC "FLEETFAY UA"	No	Yes	No	No

36	LLC "POS - MASTER"	No	Yes	No	No
37	LLC "ADVERTISING AGENCY "SANNY"	No	No	Yes	No
38	LLC "ADVERTISING AGENCY" BASTION"	No	Yes	No	No
39	LLC "PRNEWS"	No	No	Yes	No
40	LLC "GROVEX MEDIA"	No	Yes	No	No
41	LLC "FLYROCK"	No	No	Yes	No
42	LLC "LATI WEB"	No	Yes	No	No
43	LLC "LATI PRODUCTION"	No	Yes	No	No
44	LLC "KOMERTS EVOLUTION"	No	Yes	No	No
45	LLC "POLIGRAPHYCH"	No	No	Yes	No
46	LLC "JOHN DEERE UKRAINE"	No	Yes	No	No
47	LLC "STARLIGHT MEDIA"	No	Yes	No	No
48	LLC "AFISHA PRINT"	No	No	Yes	No
49	LLC "WAY AP"	No	Yes	No	No
50	"ADVERTISING AGENCY "BAGI - RA" LLC	No	No	Yes	No
Total		3	30	14	3

Source: Compiled by the authors