PAPER

Improvement-Based Approach for Control over Solvency of Commercial Organizations in the Context of Prediction of Preferred Capital Structure

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Abstract In line with the current developments and expected new challenges in the world economy, there is an objective need to comprehensively improve commercial organizations' financial management system and control processes in place. This research aims to establish a direct link between the training model developed by us for forecasting the capital structure of organizations and the process of monitoring solvency by offering new solutions. Methods of statistical and comparative analysis, as well as forecasting methods, are used. To this end, the approach of D. Durant was chosen from among the approaches to classifying the solvency of organizations. Within the scope of this article, this method has been carried out for several Armenian companies, such as "Proshyan Brandy Factory" LLC, «Vedi Alco» CJSC, and «Arge Business» LLC. As a result of the study, the authors identified three main indicators (the value of economic profitability, the values of the current liquidity index and the autonomy index), which were predicted using a new training model. The classification zones according to the D. Durant approach were also defined, as well as the ranges for their determination. The key conclusion of the study is the thesis that the proposed approach helps solve the problems of strategic financial management of commercial organizations and improve the process of monitoring solvency.

Keywords: ROA, capital requirements, financial leverage, prediction of preferred capital structure.

Jel Classification: G32, M40.

1. Introduction

We consider the regulation of the fundamental problem regarding the control over solvency and proposed new approaches to be of priority among the concept directions

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of financial management in predicting preferred capital structure in commercial organizations. It should be noted that Horne and Wachowicz (2008) proposed their solutions to the problem of control over the results of assessment and analysis of solvency. In particular, four indicators were given importance to in one of the approaches developed by this researcher: "liabilities/assets, liabilities/own capital, long-term liabilities/ (long-term liabilities + own capital) and cash flows."

It should be noted that, in analytical procedures, the first three indicators are also used in the process of assessment of financial stability and are in direct relation with the process of control over the capital of an organization.

In another opinion, the authors attached importance to the approach based on cash flows for the assessment of and control over solvency "by describing cash flows as flows of cash funds having an ongoing nature for the organization" (Horne & Wachowicz, 2008).

Within the scope of this approach, assessment of cash flows in the time phase has been stressed by taking into account that cash flows exist during the entire life cycle of the organization.

In I. Blank's opinion, "monetary funds were viewed from the investment viewpoint, as an indicator of the solvency of an organization, by considering accumulations and amortization allocations for tangible and non-tangible assets from the net profit for that purpose as primary for investments" (Blank, 2009, 300).

This opinion, in fact, emphasizes the importance of ensuring the desired level of solvency of an organization for addressing investment problems.

We should also note that separate issues of financial management of solvency of organizations have been discussed by many other foreign and Armenian researchers as well. In particular, let us refer to Bayadyan's (2002), Bocharov's (2007), Chernenko's (2007), Derevyagin's (2011), Harutyunyan's (2008), Kovalev's (2006), Kudishina's & Skorikh's (2019), Matevosyan's (2007), Mnatsakanyan's et al. (2019), Zhirukhin's (2013) opinions.

2. Literature review

Over the past 20 years, the financial management problems of commercial organizations have begun to attract the special attention of researchers and the world community. The financial results, as well as the development and expansion of the range of services, depend on the size of the equity capital and the structure of commercial organizations as a whole.

Many experts in the field of financial research have addressed the problem of studying the definitions of "liquidity" and "solvency." For example, the problems of concepts' correlation are examined in the article by Shvetsov et al. (2009).

Tahyar et al. (2012), in their research, identify two large categories of capital - normative and economic. In the context of partial provisioning, this is expressed as the capital adequacy

ratio of liquid assets that should be held relatively with the number of loans issued.

A study by a group of authors of commercial organizations in Zimbabwe, based on qualitative and quantitative methods, revealed the positive impact of capital requirements on financial performance. The study showed that if the organization is adequately capitalized, it will be competitive, and the risk of bankruptcy will be minimized (Chinoeda et al., 2015). From the study results, it can also be concluded that capital requirements allow commercial organizations to make a profit through cheap financing.

Fraisse et al. (2017) also found that capital requirements significantly impact the bank's creditworthiness. Extrapolating the results at the macroeconomic level, the authors concluded that the reaction of banks to changes in capital requirements is consistent with the credit multiplier model, where lending is a constant multiple of the available capital. A one-percentage-point increase in capital requirements reduces bank lending by about 8%, firm loans by about 4%, total assets by 1.5%, trade credit to customers by 1%, and fixed assets by 2.5%.

In a recent study, Kara (2016) argues that countries with higher returns on investment choose a lower minimum regulatory capital adequacy ratio than countries with low returns. According to his model, less strict capital rules allow banks to invest more in risky assets. A higher average return on investment reduces both the social and private marginal cost of selling bank goods and, as a result, regulators loosen capital requirements.

According to Aiyar et al. (2015), higher minimum capital requirements are a necessary step to achieve appropriate stability. However, these requirements must be reliably measured and set relative to effective limits that guarantee a level of capital commensurate with the risk level of the assets.

N. Martynova (2015) investigated the impact of regulatory capital requirements on economic growth and concluded that there is no direct evidence of whether they increase or decrease economic growth rate. Higher capital requirements can reduce the volume of lending, especially for the most dependent borrowers, such as small businesses, which can lead to lower economic growth. The high cost of equity can be passed on to borrowers in the form of higher loan rates.

Milton et al. (2014) proposed a general balanced framework for analyzing the effectiveness of capital regulation in the face of competition from other investors. Their model highlights the importance of the general equilibrium effects occurring when regulated and unregulated market participants interact in the financial market, showing that competition can cause a non-monotonic relationship between the adoption of capital requirements.

3. Methodology

Within the scope of this article, the primary purpose was considered to establish a direct link between the training model of prediction of capital structure of organizations developed by us (Baboyan, 2020) and the process of control over solvency by

proposing new solutions. To this end, D. Durant's approach was chosen from among the approaches of classification of the solvency of organizations, and we have proposed the following steps for its improvement:

1. The following steps develop a solvency prediction approach mutually related to the preferred structure of capital

   In the first step, a training model is developed (Second model), the input variables of which are:

   Y_1, — ((current assets-current liabilities)/ current assets)*100;

   Y_2 ((current assets-current liabilities)/own capital)*100;

   P_1 from among the quintet P_1-P_5 — (own capital/ liabilities)*100

   Training with the ROA — return on assets, is conducted with the variables presented for observed organizations;

2. In the second step, the quintet of liabilities of observed organizations is firstly predicted with the input variables Y1, Y2 (actually) by using the prediction training model developed by us within the scope of improvement of the behavioural theory of capital (**First model**). The couple Y_1, Y_2 is predicted by the same training model (**First model**) by the relevant counter-relation of the quintet P_1-P_5 of predicted liabilities.

3. By using the (**Second model**), ROA — return on assets or, in other words, economic profitability, is predicted in the third step, and we can resent the basis for its calculation with the formula ((gross or operating profit)/ total assets))*100.

4. In the fourth step, actual and predicted values of ROA are compared, which are put at the basis of the administrative decision being rendered, in order to specify the solvency zone by D. Durant's approach.

5. In the fifth step, the actual values of ROA — return on assets, coefficients K_1 — current liquidity, and K_2 — autonomy (independence) of organization are calculated for randomly selected commercial organizations, and preliminary classification of solvency zones is carried out by D. Durant's approach.

6. In the sixth step, adjustment of the cumulative score of solvency and classification zones of randomly selected commercial organizations of the Republic of Armenia is carried out according to the predicted ROA, by leaving the values of K_1 and K_2 constant in this stage.

Step one. In the first step, to develop a training model, the research sample for calculation of the input variables by us comprised 185 observations — 72 commercial organizations of the Republic of Armenia.

To predict the ROA of assets through the triplet of variables P_1, Y_1, Y_2, a neural network with the structure 3 – 6 – 9 – 15 – 9 – 3 -1 was developed through the TensorFlow package, and the function for sigmoid activation operates between the neighbouring layers; in relation to

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$$\phi_k(x) = \frac{1}{1 + e^{-x}} \tag{1}$$

, where

$$x = \sum_{i=1}^{m} w_{kj} x_j \tag{2}$$

where m is the number of neurons in the previous — "input" layer, X_j is the output signal of neuron j of that layer, w_{kj} is the share corresponding to the relation $j \rightarrow k$.

The problem of share optimization is solved during the training through the gradient descent algorithm (Diederik & Ba, 2015).

The model developed and optimized based on training data carried out calculation of the loss function during the work of the program, and the average squared error is selected as the loss function in our case. The aim of the gradient descent method is the very minimization of the loss function. Test data do not participate in the process of loss descent function of optimization of the model. However, after each iteration, test data are entered in the improved model, and the output result of the model is already compared with the relevant figure of the test data. Thus, the applicability of the model is also checked in the course for data other than the training data. Table 1 of the Appendix shows the model's results built on the training data.

In the next sub-step, results of the application of the model already developed are given on test data not having participated in the training process (see Table 1).

Table 1. The results of the test data not having participated in the training process of the (Second Model)

The sample number of the organization studied is	P_1	Y_1	Y_2	True ROA	Predicted	RE
34	-17.8626	-18.93	103.06	8.5970	6.1183	-0.28832
53	9.551399	9.55	100	9.5318	6.4945	-0.31865
61	37.68103	37.43	79.87	6.2337	17.4592	1.800768
8	94.79011	97.32	33.88	3.1077	4.3908	0.41287
60	77.71751	81.23	59.26	14.6822	15.5100	0.056381
74	4.513078	4.51	100	4.5736	6.3618	0.39097
81	7.028041	22.36	100.9	15.4178	6.9296	-0.55054
88	21.40306	69.24	187.88	1.6978	3.7545	1.211366
50	53.56928	34.15	44.94	3.1870	17.3543	4.445305
87	58.94587	54.28	76.84	17.2886	3.4686	-0.79937

The sample number of the organization studied is	P_1	Y_1	Y_2	True ROA	Predicted	RE
54	47.90291	77.76	103.27	2.1761	3.4823	0.600215
14	77.11852	83.37	85.77	5.8177	1.4453	-0.75156
70	78.09242	25.85	9.78	16.3874	15.7794	-0.0371
7	95.12842	90.83	5.26	2.9600	3.8085	0.286653
84	27.65625	85.32	102.38	10.9880	7.2551	-0.33973
5	85.19837	64.6	30.11	10.3772	19.2132	0.851489
71	35.01466	81.55	129.17	33.4682	3.9112	-0.88314
26	56.00346	68.92	63.44	2.6552	18.6331	6.017562

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco. am/hy.

After creating a model predicting return on assets based on independent input variables P_1, Y_1, Y_2, we solve the issue of ROA by the below-indicated model through the variables y_1, y_2.

By the (First model) of training, we predict the Y_1, Y_2 couples corresponding to all possible $P_1 - P_5$ quintets. Then we solve a reverse problem by choosing from among the complex of data of created P_1-P_5, Y_1, Y_2 data the quintets which correspond to Y_1, Y_2 couples we have. Thus, several P_1-P_5 quintets may correspond to the same Y_1, Y_2 couple. Then ROA, namely the return on assets, is predicted through P_1, Y_1, Y_2 triplet we already have.

Step two. We firstly predict the quintet of liabilities P_1-P_5 (%) for the randomly selected commercial organization of the Republic of Armenia through Y_1, Y_2 actual input variables; then we predict the Y_1, Y_2 couple through reverse relation. The prediction results are presented in Table 2.

Table 2. Results of prediction of the quintet P_1-P_5 (%) of liabilities of randomly selected commercial organization of the Republic of Armenia

Selected organization	P_1	P_2	P_3	P_4	P_5	Y_1 actual	Y_2 actual	Year
			Predicted					
«Proshyan Brandy Factor» LLC	28.5817	64.64867	2.808227	9.252627	0.002048	87.02	224.89	2019

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«Proshyan Brandy Factor» LLC	16.82744	40.7245	0.354777	4.112093	2.444693			
	28.5817	58.66763	0.354777	9.252627	0.002048	91.04	217.23	2018
	40.33597	58.66763	0.354777	4.112093	7.329984			
«Vedi Alco» CJSC	22.70457	40.7245	2.808227	4.112093	0.002048			
	34.45884	40.7245	0.354777	4.112093	4.887338			
	46.2131	58.66763	2.808227	4.112093	4.887338	89.1	139.1	2019
	52.09024	64.64867	0.354777	11.82289	2.444693			
	57.96737	58.66763	0.354777	4.112093	9.772629			
«Vedi Alco» CJSC	28.5817	28.76241	0.354777	6.68236	2.444693			
	40.33597	46.70554	2.808227	6.68236	2.444693			
	40.33597	52.68659	5.261677	4.112093	2.444693			
	46.2131	52.68659	0.354777	14.39316	0.002048			
	46.2131	58.66763	2.808227	11.82289	0.002048	80.1	113.1	2018
	46.2131	58.66763	5.261677	6.68236	2.444693			
	52.09024	46.70554	0.354777	6.68236	7.329984			
	63.8445	64.64867	2.808227	6.68236	7.329984			
	75.59877	64.64867	0.354777	6.68236	12.21527			
	69.72164	40.7245	0.354777	4.112093	19.54321			
«Arge Business» LLC	22.70457	34.74345	0.354777	6.68236	0.002048			
	22.70457	40.7245	2.808227	4.112093	0.002048			
	34.45884	58.66763	5.261677	4.112093	0.002048	91.49	197.65	2019
	46.2131	52.68659	0.354777	6.68236	4.887338			
	46.2131	58.66763	2.808227	4.112093	4.887338			
	63.8445	64.64867	0.354777	4.112093	9.772629			
«Arge Business» LLC	16.82744	46.70554	2.808227	4.112093	0.002048			
	40.33597	64.64867	0.354777	9.252627	2.444693	89.69	135.7	2018
	40.33597	64.64867	2.808227	4.112093	4.887338			

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco.am/hy.

It should be noted that, by the results of prediction of the quintet P_1-P_5 (%) of liabilities of randomly selected commercial organization of the Republic of Armenia, the following has been predicted:

- one preferable variant for "Proshyan Brandy Factory" LLC in 2019, three

preferable variants in 2018;
- five preferable variants for "Vedi Alco" CJSC in 2019, nine preferable variants in 2018;
- six preferable variants for "Arge Business" LLC in 2019, three preferable variants in 2018.

In the second step, we predicted the Y_1, Y_2 couple for organizations selected through the application of the reverse relation (First model). The prediction results are presented in Table 3.

Table 3. Results of prediction of the Y_1, Y_2 couple by the preferable P_1-P_5 (%) quintet of liabilities of randomly selected commercial organization of the Republic of Armenia

Selected organization	P_1	P_2	P_3	P_4	P_5	Y_1	Y_2	Year
				Predicted				
«Proshyan Brandy Factor» LLC	28.5817	64.64867	2.808227	9.252627	0.002048	86.08921	225.7637	2019
«Proshyan Brandy Factor» LLC	16.82744	40.7245	0.354777	4.112093	2.444693	90.2532	216.9203	
	28.5817	58.66763	0.354777	9.252627	0.002048	92.54009	217.0703	2018
	40.33597	58.66763	0.354777	4.112093	7.329984	89.96515	216.6511	
«Vedi Alco» CJSC	22.70457	40.7245	2.808227	4.112093	0.002048	89.41513	137.4384	
	34.45884	40.7245	0.354777	4.112093	4.887338	88.47531	139.4052	
	46.2131	58.66763	2.808227	4.112093	4.887338	89.10179	137.2892	2019
	52.09024	64.64867	0.354777	11.82289	2.444693	88.56823	138.1519	
	57.96737	58.66763	0.354777	4.112093	9.772629	88.13634	139.2513	
«Vedi Alco» CJSC	28.5817	28.76241	0.354777	6.68236	2.444693	81.18758	113.6683	
	40.33597	46.70554	2.808227	6.68236	2.444693	81.9489	112.0192	
	40.33597	52.68659	5.261677	4.112093	2.444693	81.62584	114.1508	
	46.2131	52.68659	0.354777	14.39316	0.002048	81.29689	112.7006	
	46.2131	58.66763	2.808227	11.82289	0.002048	80.98068	114.8239	2018
	46.2131	58.66763	5.261677	6.68236	2.444693	78.33042	113.1202	
	52.09024	46.70554	0.354777	6.68236	7.329984	80.79923	113.5508	
	63.8445	64.64867	2.808227	6.68236	7.329984	81.55015	111.9003	
	75.59877	64.64867	0.354777	6.68236	12.21527	80.41782	113.4333	

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Organization								Year
«Arge Business» LLC	22.70457					89.66217	134.7965	2019
	22.70457					89.41512	137.4384	
	34.45884					89.99168	135.3876	
	46.2131					89.35606	134.6536	
	46.2131					89.10179	137.2892	
	63.8445					91.58069	135.7728	
«Arge Business» LLC	16.82744	46.70554	2.808227	4.112093	0.002048	89.96672	196.0551	2018
	40.33597	64.64867	0.354777	9.252627	2.444693	91.67226	199.6476	
	40.33597	64.64867	2.808227	4.112093	4.887338	89.6698	195.791	

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco.am/hy.

In the second step, prediction data obtained in accordance with the observations carried out for randomly selected commercial organizations of the Republic of Armenia will be input variables for training for (Second model).

Step three. ROA — Return on assets or, in other words, economic profitability, is predicted in the third step by using the **(Second model)**. The prediction results of this step are presented in Table 4.

Table 4. Results of predication of ROA with the inclusion of Y_1, Y_2 couple and P_1 from among P_1-P_5 (%) quintet of liabilities of randomly selected commercial organization of the Republic of Armenia

Selected organization	P_1	Y_1	Y_2	ROA predicted	Year
«Proshyan Brandy Factor» LLC	28.5817	86.08921	225.7637	78.95646	2019
«Proshyan Brandy Factor» LLC	16.82744	90.2532	216.9203	17.86896	2018
	28.5817	92.54009	217.0703	80.88562	
	40.33597	89.96515	216.6511	108.3528	
«Vedi Alco» CJSC	22.70457	89.41513	137.4384	8.719328	2019
	34.45884	88.47531	139.4052	3.54921	
	46.2131	89.10179	137.2892	1.726223	
	52.09024	88.56823	138.1519	7.573615	
	57.96737	88.13634	139.2513	30.34462	

Selected organization	P_1	Y_1	Y_2	ROA predicted	Year
«Vedi Alco» CJSC	28.5817	81.18758	113.6683	21.0295	2018
	40.33597	81.9489	112.0192	5.865386	
	40.33597	81.62584	114.1508	3.915435	
	46.2131	81.29689	112.7006	3.473449	
	46.2131	80.98068	114.8239	3.635673	
	46.2131	78.33042	113.1202	3.846889	
	52.09024	80.79923	113.5508	3.3002	
	63.8445	81.55015	111.9003	2.450858	
	75.59877	80.41782	113.4333	41.66459	
«Arge Business» LLC	22.70457	89.66217	134.7965	15.94222	2019
	22.70457	89.41512	137.4384	8.719267	
	34.45884	89.99168	135.3876	3.373597	
	46.2131	89.35606	134.6536	1.654464	
	46.2131	89.10179	137.2892	1.726223	
	63.8445	91.58069	135.7728	53.31585	
«Arge Business» LLC	16.82744	89.96672	196.0551	3.496242	2018
	40.33597	91.67226	199.6476	95.58797	
	40.33597	89.6698	195.791	85.58482	

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco. am/hy.

In the third step, it is necessary to compare the values of ROA predicted by the (Second model) of training with the actual values and render a decision on preferable variants.

Step four. The preferable variants outlined by us as a result of comparing the predicted ROA and actual values for the randomly selected commercial organizations of the Republic of Armenia are presented in Table 5.

Table 5. Selection of the preferable variant by comparing the predicted and actual values of ROA of randomly selected commercial organization of the Republic of Armenia

Selected organization	P_1	Y_1	Y_2	ROA predicted	ROA actual	Year
«Proshyan Brandy Factor» LLC	28.5817	86.08921	225.7637	78.95646	18.25	2019

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«Proshyan Brandy Factor» LLC	16.82744	90.2532	216.9203	17.86896	19.63	2018
	28.5817	92.54009	217.0703	80.88562	19.63	
	40.33597	89.96515	216.6511	108.3528	19.63	
«Vedi Alco» CJSC	22.70457	89.41513	137.4384	8.719328	12.59	2019
	34.45884	88.47531	139.4052	3.54921	12.59	
	46.2131	89.10179	137.2892	1.726223	12.59	
	52.09024	88.56823	138.1519	7.573615	12.59	
	57.96737	88.13634	139.2513	30.34462	12.59	
«Vedi Alco» CJSC	28.5817	81.18758	113.6683	21.0295	12.87	2018
	40.33597	81.9489	112.0192	5.865386	12.87	
	40.33597	81.62584	114.1508	3.915435	12.87	
	46.2131	81.29689	112.7006	3.473449	12.87	
	46.2131	80.98068	114.8239	3.635673	12.87	
	46.2131	78.33042	113.1202	3.846889	12.87	
	52.09024	80.79923	113.5508	3.3002	12.87	
	63.8445	81.55015	111.9003	2.450858	12.87	
	75.59877	80.41782	113.4333	41.66459	12.87	
«Arge Business» LLC	22.70457	89.66217	134.7965	15.94222	25.7	2019
	22.70457	89.41512	137.4384	8.719267	25.7	
	34.45884	89.99168	135.3876	3.373597	25.7	
	46.2131	89.35606	134.6536	1.654464	25.7	
	46.2131	89.10179	137.2892	1.726223	25.7	
	63.8445	91.58069	135.7728	53.31585	25.7	
«Arge Business» LLC	16.82744	89.96672	196.0551	3.496242	24.7	2018
	40.33597	91.67226	199.6476	95.58797	24.7	
	40.33597	89.6698	195.791	85.58482	24.7	

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco. am/hy.

In the fourth step, the following results of preferable variants are substantiated for randomly selected commercial organizations of the Republic of Armenia as a result of comparing the predicted and actual ROA:

- one preferable variant for "Proshyan Brandy Factory" LLC in 2019, ROA — 78.95 % variant; two variants in 2018 — 80.88% and 108.35 %;
- five preferable variants for "Vedi Alco" CJSC in 2019, 30.34 %; two variants in 2018 — 21.02% and 41.66 %;

- six preferable variants for "Arge Business" LLC in 2019, 53.31 %; two variants in 2018 — 85.58 % and 95.58%.

Step five. In this step, we have presented the actual values of ROA — return on assets, and coefficients K_1 — current liquidity, and K_2 — autonomy (independence) for randomly selected commercial organization in Table 6.

Table 6. Actual values of indicators used within D. Durant's solvency classification approach for randomly selected commercial organizations of the Republic of Armenia

Name of the selected organization	ROA	K_1	K_2	Year
"Proshyan Brandy Factory" LLC	19.63	7.7	0.344	2018
"Proshyan Brandy Factory" LLC	18.25	11.16	0.368	2019
«Vedi Alco» CJSC	12.87	9.22	0.512	2018
«Vedi Alco» CJSC	12.59	5.016	0.513	2019
«Arge Business» LLC	24.7	9.66	0.596	2018
«Arge Business» LLC	25.7	12.07	0.416	2019

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco.am/hy.

Based on the data of Table 6 and using Durant's approach, in Table 7, we have presented the results of the classification of solvency zones of randomly selected commercial organizations of the Republic of Armenia.

Table 7. Results of D. Durant's solvency classification approach for randomly selected commercial organizations of the Republic of Armenia

Name of the selected organization	ROA	K_1	K_2	Total score	Solvency zone	Year
"Proshyan Brandy Factory" LLC	34.9	30	5	69.9	II zone	2018
"Proshyan Brandy Factory" LLC	30.04	30	5	65.04	II zone	2019
«Vedi Alco» CJSC	27.33	30	10.02	67.35	II zone	2018
«Vedi Alco» CJSC	27.4	30	10.02	67.42	II zone	2019
«Arge Business» LLC	49.8	30	10.02	89.82	II zone	2018
«Arge Business» LLC	49.39	30	5.02	84.41	II zone	2019

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco.am/hy.

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Step six. By leaving the actual values of the coefficients K_1 — current liquidity, and K_2 — autonomy (independence), constant within the scope of this article and entering the predicted values of ROA, we will have the solvency classification picture presented in Table 8 according to researched organizations.

Table 8. D. Durant's solvency classification results for randomly selected commercial organizations of the Republic of Armenia according to the predicted ROA

Name of the selected organization	ROA	K_1	K_2	Total score	Solvency zone	Year
"Proshyan Brandy Factory" LLC	50	30	5	85	II zone	2018
	50	30	5	85	II zone	(for two variants)
"Proshyan Brandy Factory" LLC	50	30	5	85	II zone	2019
«Vedi Alco» CJSC	47.58	30	10.02	87.6	II zone	2018
	50	30	10.02	90.02	II zone	(for two variants)
«Vedi Alco» CJSC	50	30	10.02	90.02	II zone	2019
«Arge Business» LLC	50	30	10.02	90.02	II zone	2018
«Arge Business» LLC	50	30	5.02	85.02	II zone	2019

Source: Calculated by author according to data of https://proshyan.ru/, https://arge.am/, https://vedi-alco.am/hy.

4. Conclusion

Let us note that in the case of application of RAO predicted following the structure proposed by the (Third model) in D. Durant's solvency classification approach, a significant improvement of the cumulative score has taken place for all three researched organizations. However, the solvency zone has remained unchanged. It is appropriate to further develop similar training models for predicting coefficients K1 — current liquidity, and K2 — autonomy (independence).

It should be noted that the index of ROA (economic profitability) has an important significance from the point of view of calculation of the financial leverage, which is extremely necessary for commercial banks in the process of provision of credit (Basovsky, 2003; Blank, 2014).

Hence, the (Second model) training model of prediction proposed by us can be applied in practice by commercial banks for the assessment of capacities for the formation of the preferred structure of possible credit capital, determining the level of expected solvency and controlling the financial risk conditioned by the ration credit

capital/own capital. When solving strategic financial management problems, in the case of formation of preferred predicted structure in commercial organizations, it will be possible to essentially improve the process of control over solvency, which is needed by the vast majority of commercial banks in the Republic of Armenia, conditioned by the negative effects of the COVID-19 pandemic and the Artsakh war.

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Appendix

Table 1. Characteristics of the (second model) according to the training data

The sample number of the organization studied	P_1	Y_1	Y_2	True ROA	Predicted	RE
46	94.50662	93.15	79.04	2.5	2.9	0.144699
79	19.30813	19.18	41.62	0.9	5.7	5.49172
23	55.99082	17.27	14.88	0.5	7.0	12.35305
51	4.897774	4.9	100	4.9	6.4	0.301126
3	96.8094	94.83	49.21	10.7	6.8	-0.36072
13	78.74772	72.01	68.68	7.1	3.2	-0.54939

33	66.50505	85.36	2.97	1.5	3.5	1.368473
73	59.85852	39.09	43.03	1.8	11.9	5.698021
83	26.84058	22.6	69.15	20.5	7.4	-0.63817
67	20.40684	64.75	168.93	0.5	4.8	8.409028
80	93.7916	93.97	22.94	5.2	4.1	-0.21364
57	93.73118	97.26	34.89	3.4	4.4	0.303727
11	52.31659	46.53	77.49	4.7	2.3	-0.5142
24	58.02184	19.3	15.73	0.5	7.6	14.35676
85	13.91117	34.94	192.88	14.7	13.1	-0.11103
42	82.5148	78.49	46.01	8.8	10.0	0.140782
27	47.07031	51.22	46.21	2.7	16.8	5.156868
6	99.02413	98.75	41.03	3.4	5.1	0.50093
29	87.20011	94.34	37.78	5.6	4.3	-0.24604
21	55.53462	18.99	16.66	1.3	7.3	4.777842
47	77.29054	30.75	13.05	19.6	17.8	-0.09106
44	45.03675	74.9	162.16	11.1	8.3	-0.25316
40	82.09803	86.67	65.33	12.5	19.4	0.557002
56	16.79903	16.89	43.93	4.9	5.8	0.190909
77	47.15995	76.52	97.8	1.2	5.8	3.876678
43	12.1137	8.86	51.6	8.8	6.0	-0.31443
30	67.91763	93.69	30.54	1.5	3.6	1.361283
64	30.0674	38.3	105.23	30.0	17.5	-0.41648
66	53.00002	67.28	103.62	10.0	4.5	-0.54603
52	-8.39645	-6.08	69.26	17.3	6.1	-0.64762
55	30.67227	29.37	94.01	9.3	10.5	0.120075
25	87.86296	84.27	41.89	0.9	6.3	5.740321
39	76.11661	86.83	61.91	10.5	8.4	-0.19529
78	13.77654	12.57	89.96	12.7	6.6	-0.4843
18	37.21755	44.44	108.67	7.6	5.0	-0.34679
76	5.655876	5.66	100	5.7	6.4	0.129497

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63	36.96605	76.77	84.56	13.8	9.5	-0.3133
41	90.44952	73.6	26.94	11.4	7.2	-0.36743
28	86.46606	94.8	43.39	1.8	4.5	1.524347
15	69.3518	79.99	107.27	3.1	5.1	0.622077
20	51.83792	13.59	13.16	1.3	6.4	4.094807
82	75.59877	74.18	52.65	8.9	18.5	1.068093
68	23.07002	67.22	147.68	1.4	4.6	2.191612
75	17.79624	13.19	70.18	17.7	6.5	-0.63437
32	5.627485	18.94	36.11	2.5	4.5	0.821336
65	91.43031	82.52	44.24	5.1	10.7	1.106201
36	41.15616	48.29	14.43	11.6	3.7	-0.68034
10	59.09708	56.28	86.61	5.7	4.4	-0.22781
17	52.14904	59.07	101.91	5.3	4.7	-0.11748
45	33.01391	84.71	194.62	28.7	30.4	0.060166
49	33.7493	15.96	11.21	9.2	4.9	-0.47131
86	89.50244	83.72	60.3	38.1	32.8	-0.13974
0	87.05777	69.84	32.39	5.8	13.5	1.321395
72	62.09239	87.49	138.22	46.0	50.6	0.100361
69	97.16868	96.48	79.93	8.1	10.6	0.310956
2	98.55193	98.42	58.45	17.9	9.4	-0.47535
38	50.15555	41.39	70.19	17.5	7.0	-0.59967
58	86.17851	69.05	35.65	44.0	19.2	-0.56348
62	22.84081	47.87	190.96	1.9	3.2	0.689276
16	59.23466	67.59	100.29	2.1	4.0	0.941026
31	67.37174	92	31.02	1.4	3.6	1.569782
9	92.77651	87.61	12.68	3.6	3.9	0.062537
35	40.43748	17.48	6.59	13.4	4.9	-0.63364
37	30.1192	29.05	95.01	0.6	10.2	15.0548
1	86.07206	64.48	28.12	15.0	17.6	0.169024
12	64.35059	73.8	84.86	9.2	3.5	-0.61801

4	95.8162	92.95	49.68	17.6	7.5	-0.57107
48	64.78065	90.14	135.74	61.0	60.1	-0.0141
59	41.37279	47.45	45.81	29.1	14.8	-0.49082
19	51.63194	14.24	13.51	1.7	6.4	2.799152
22	56.62721	18.05	15.19	0.2	7.2	31.11756

Source: Calculated by author according to data of https://proshyan.ru/*,* https://arge.am/*, https://vedi-alco. am/hy.*