ORIGINAL SCIENTIFIC PAPER

ANALYSIS OF THE EXTERNAL POSITION OF SERBIA BASED ON THE LMAW-DNMA METHOD

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ABSTRACT

The openness of the economy affects the liquidity and solvency of Serbia. Likewise, the degree of exposure to financial risks. Serbia's best external position was in 2009. The following are: 2011, 2007, 2010, 2012, 2013, 2006, 2008, 2014, 2015, 2016, 2017, 2019, 2018, 2021, 2005, and 2020. The worst external position of Serbia was in 2020. By increasing the open economy, the external position of Serbia can be significantly improved.

Keywords: *external position, Serbia, LMAW-DNMA method*

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INTRODUCTION

It is very important to ask: what are the dynamics of the open position of each economy, which also characterizes Serbia? The answer to this question is provided by the application of the multi-criteria decision-making method [1-10]. The research on the dynamics of Serbia's open position in this study is carried out using the LMAW-DNMA method [4]. The analyzed relevant criteria using this method are nothing but factors of the open position of the economy. It can be significantly improved by their successful control.

MATERIALS AND METHODS

In further presentations of the treated issues, we will briefly refer to the characteristics of LMAW-DNMA methods [4].

The LMAW method is the latest method used to calculate criteria weights and rank alternatives. Diagram 1 shows the steps of the LMAW method application process [4]. Table 1 shows the relevant formulas according to the steps of application of the LMAW method [4].

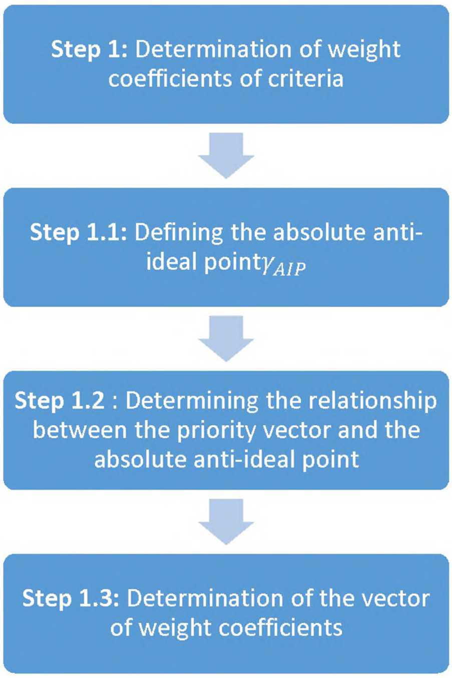

Diagram 1. Steps of the LMAW method application process

Table 1. Applied formulas according to the steps of the LMAW method

Steps	**Formulas**
Step 1: Determination of weight coefficients of criteria	
Step 1.1: Defining the absolute anti-ideal pointγ_{AIP}	$\gamma_{AIP} = \frac{\gamma_{min}^{e}}{S}$
Step 1.2: Determining the relationship between the priority vector and the absolute anti-ideal point	$n_{Cn}^{e} = \frac{\gamma_{Cn}^{e}}{\gamma_{AIP}}$

Step 1.3: Determination of the vector of weight coefficients	$w_j^e = \frac{\log_A(n_{Cn}^e)}{\log_A\left(\prod_{j=1}^{n} n_{Cn}^e\right)}, A > 1$
By applying the Bonferroni aggregator shown in the following equation, the aggregated vector of weight coefficients is determined $w = (w_1, w_2, \dots, w_n)^T$	$W_j = \left(\frac{1}{k.(k-1)} \cdot \sum_{x=1}^{k} \left(w_j^{(x)}\right)^p \cdot \sum_{\substack{y=1 \\ Y \neq x}}^{k} \left(w_{ij}^{(y)}\right)^q\right)^{\frac{1}{p+q}}$

Source: [4]

The DNMA method is a newer method for showing alternatives. Two different normalized (linear and vector) techniques are used, as well as three different coupling functions (Complete Compensatory Model - CCM, Uncompensatory Model - UCM, and Incomplete Compensatory Model - ICM). The steps of applying this method are as follows, diagram 2 [4]. Diagram 2 shows the steps of the application process of the DNMA method. Table 2 shows the applied formulas according to individual steps of the DNMA method [4].

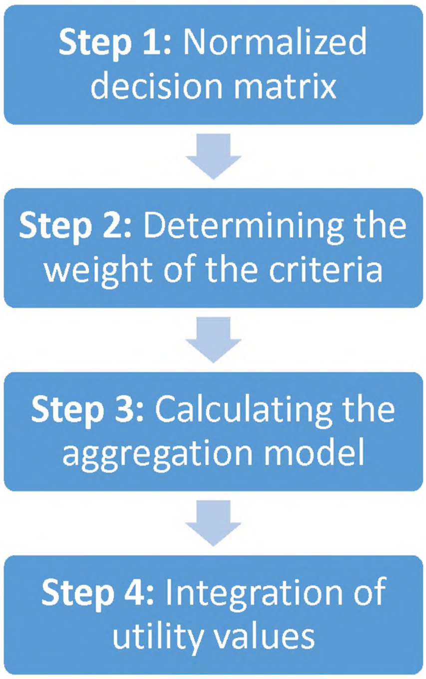

Diagram 2. Steps of the DNMA method application process

Table 2. Applied formulas according to the steps of applying the DNMA method

Steps	Formulas
Step 1: Normalized decision matrix	$\hat{x}_{ij}^{1N} = 1 - \frac{\lvert x^{ij} - r_j \rvert}{max\left\{\max_i x^{ij}, r_j\right\} - min\left\{\min_i x^{ij}, r_j\right\}}$ $\hat{x}_{ij}^{2N} = 1 - \frac{\lvert x^{ij} - r_j \rvert}{\sqrt{\sum_{i=1}^{m} (x^{ij})^2 + (r_j)^2}}$

Step 2: Determining the weight of the criteria	
Step 2.1: In this phase, the standard deviation $(\sigma_j)$for the criterion $c_j$is determined with the following equation where *m* is the number of alternatives	$\sigma_j = \sqrt{\frac{\sum_{i=1}^{m}\left(\frac{x^{ij}}{\max_i x^{ij}} - \frac{1}{m}\sum_{i=1}^{m}\left(\frac{x^{ij}}{\max_i x^{ij}}\right)\right)^2}{m}}$
Step 2.2: Values of the standard deviation calculated for the criteria se normalize with the following equation	$w_j^{\sigma} = \frac{\sigma_j}{\sum_{i=1}^{n}\sigma_j}$
Step 2.3: Finally, the weights are adjusted with the following equation:	$\widehat{w}_j = \frac{\sqrt{w_j^{\sigma}.w_j}}{\sum_{i=1}^{n}\sqrt{w_j^{\sigma}.w_j}}$
Step 3: Calculating the aggregation model	
CCM (Complete Compensation Model)	$u_1(a_i) = \sum_{j=1}^{n}\frac{\widehat{w}_j.\hat{x}_{ij}^{1N}}{\max_i \hat{x}_{ij}^{1N}}$
UCM (Uncompensatory Model)	$u_2(a_i) = \max_j \widehat{w}_j\left(\frac{1-\hat{x}_{ij}^{1N}}{\max_i \hat{x}_{ij}^{1N}}\right)$
ICM (Incomplete Compensation Model)	$u_3(a_i) = \prod_{j=1}^{n}\left(\frac{\hat{x}_{ij}^{2N}}{\max_i \hat{x}_{ij}^{2N}}\right)^{\widehat{w}_j}$
Step 4: Integration of utility values	$DN_i = w_1\sqrt{\varphi\left(\frac{u_1(a_i)}{\max_i u_1(a_i)}\right)^2 + (1-\varphi)\left(\frac{m-r_{1(a_i)+1}}{m}\right)^2} - w_2\sqrt{\varphi\left(\frac{u_2(a_i)}{\max_i u_2(a_i)}\right)^2 + (1-\varphi)\left(\frac{r_2(a_i)}{m}\right)^2} + w_3\sqrt{\varphi\left(\frac{u_3(a_i)}{\max_i u_3(a_i)}\right)^2 + (1-\varphi)\left(\frac{m-r_3(a_i)+1}{m}\right)^2} \quad (12)$

Source: [4]

RESULTS AND DISCUSSIONS

When analyzing the external position of Serbia based on the LMAW-DNMA method, indicators of the external position of Serbia were used as criteria. Criteria and alternatives, as well as initial data, are shown in Table 3. Figure 1 shows the dynamics of Serbia's external position. (All pictures in this work are the author's.)

Table 3. Indicators of Serbia's external position

		EXTERNAL LIQUIDITY INDICATORS (in %)					EXTERNAL SOLVENCY INDICATORS (in %)			FINANCIAL RISK EXPOSURE INDICATORS (in %)		OPENNESS OF ECONOMY
		Foreign exchange reserves	Foreign exchange reserves /short-term debt	Foreign exchange reserves	Debt repayment/GDP	Debt repayment/exports of goods and	External debt/GDP	Short-term debt/GDP	External debt/exports of goods and services	Foreign exchange reserves / M1	Foreign exchange reserves/ reserve money	(Exports + Imports)/GDP
		C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**
A1	2005	6.1	177	22.1	4.7	19.8	56.2	12.5	234.9	290.3	169.8	67.1
A2	2006	9	265.1	34.8	9.7	36.2	55.2	13.1	205.7	356.1	179.5	73
A3	2007	7.5	250.6	30.5	9.6	37.5	55.1	12.2	214.3	306.7	173.8	74.7
A4	2008	5.4	162.6	22.9	10.1	37.5	58.8	14.1	218.9	300.4	140.7	78
A5	2009	9.7	220.6	32.6	12.1	48.8	68.6	14.8	276.9	393.4	190.5	65.1
A6	2010	8.4	191.2	31.7	11.3	37.5	74.5	16.6	247.1	416.6	196.4	75.3
A7	2011	8.8	299.9	34	11.7	37.3	68.1	11.3	216.5	429.6	207.6	78
A8	2012	7.7	237.3	32.4	12.3	36	76.1	13.7	223.6	402.1	197.9	84.5
A9	2013	7.6	268.6	30.7	12.6	33	70.4	11.4	184	330.4	199.9	87.1
A10	2014	6.6	294	27.9	13.3	32.7	72.4	9.5	177.7	278.1	196.6	91.8
A11	2015	6.7	256.4	29.1	11.1	25.2	73.4	11.3	166.8	250.2	193.7	96.2
A12	2016	6.2	2 3 4	27.8	12.3	25.9	72	11.9	152.4	207.3	196.6	100.6
A13	2017	5.4	202.1	25.4	10.9	22.2	65.1	12.6	132.2	176.2	185	106.2
A14	2018	5.4	210.9	26.3	11.3	22.9	62.2	12.4	126	168	171.4	108.2
A15	2019	5.7	275.6	29.1	10	19.7	61.4	10.6	121	174.1	194.1	111.5
A16	2020	6.1	228.1	28.8	5.8	12.2	65.8	12.6	138.2	130	157.1	103.9
A17	2021	6	245.7	30.9	9.2	17.1	68.4	12.6	127.7	138.1	180	115.7
	Statistics											
	Mean	6.9588	236.4529	29.2353	10.4706	29.5000	66.1000	12.5412	186.1118	279.2706	184.1529	89.2294
	Median	6.6000	237.3000	29.1000	11.1000	32.7000	68.1000	12.5000	184.0000	290.3000	190.5000	87.1000
	Std. Deviation	1.37934	39.21491	3.58851	2.28849	9.70322	6.90054	1.65116	48.07291	100.53325	17.34287	16.32451
	Minimum	5.40	162.60	22.10	4.70	12.20	55.10	9.50	121.00	130.00	140.70	65.10
	Maximum	9.70	299.90	34.80	13.30	48.80	76.10	16.60	276.90	429.60	207.60	115.70

Note: Author's statistics

Source: National Bank of Serbia

In this particular case, the open economy was at its peak in 2021. This had a positive impact on Serbia's liquidity and slovenliness.

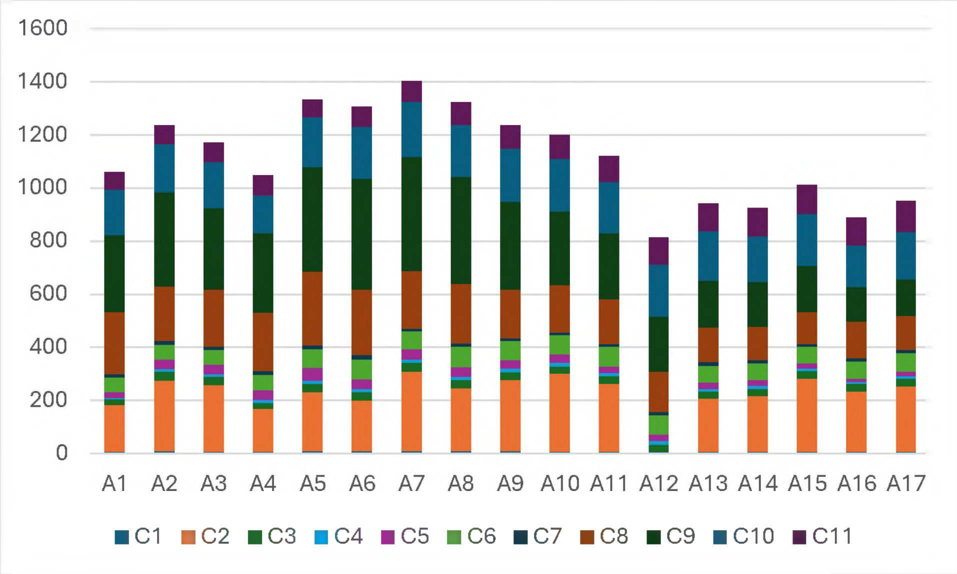

Figure 1. Dynamics of Serbia's external position

Figure 2 shows the nature of the criterion.

Figure 2. The character of the criterion

Therefore, in this case, the most important criterion is C5 - Debt repayment/exports of goods and services. Conversely, the most insignificant criterion is C10 - Foreign exchange reserves/ reserve money.

Table 2 and Figure 3 show the calculation process and the result of applying the DNMA method in a specific case.

Table 2. Calculation and result of the LMAW-DNMA method

INITIAL MATRIX											
KIND	1	1	1	1	1	1	1	1	1	1	1
Weight	0.0929	0.0954	0.0928	0.0968	0.0999	0.0899	0.0981	0.0970	0.0846	0.0652	0.0859
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**
A1	6.1	177	22.1	4.7	19.8	56.2	12.5	234.9	290.3	169.8	67.1
A2	9	265.1	34.8	9.7	36.2	55.2	13.1	205.7	356.1	179.5	73
A3	7.5	250.6	30.5	9.6	37.5	55.1	12.2	214.3	306.7	173.8	74.7
A4	5.4	162.6	22.9	10.1	37.5	58.8	14.1	218.9	300.4	140.7	78
A5	9.7	220.6	32.6	12.1	48.8	68.6	14.8	276.9	393.4	190.5	65.1

A6	8.4	191.2	31.7	11.3	37.5	74.5	16.6	247.1	416.6	196.4	75.3
A7	8.8	299.9	34	11.7	37.3	68.1	11.3	216.5	429.6	207.6	78
A8	7.7	237.3	32.4	12.3	36	76.1	13.7	223.6	402.1	197.9	84.5
A9	7.6	268.6	30.7	12.6	33	70.4	11.4	184	330.4	199.9	87.1
A10	6.6	294	27.9	13.3	32.7	72.4	9.5	177.7	278.1	196.6	91.8
A11	6.7	256.4	29.1	11.1	25.2	73.4	11.3	166.8	250.2	193.7	96.2
A12	6.2	2 3 4	27.8	12.3	25.9	72	11.9	152.4	207.3	196.6	100.6
A13	5.4	202.1	25.4	10.9	22.2	65.1	12.6	132.2	176.2	185	106.2
A14	5.4	210.9	26.3	11.3	22.9	62.2	12.4	126	168	171.4	108.2
A15	5.7	275.6	29.1	10	19.7	61.4	10.6	121	174.1	194.1	111.5
A16	6.1	228.1	28.8	5.8	12.2	65.8	12.6	138.2	130	157.1	103.9
A17	6	245.7	30.9	9.2	17.1	68.4	12.6	127.7	138.1	180	115.7
MAX	9.7000	299.9000	34.8000	13.3000	48.8000	76.1000	16.6000	276.9000	429.6000	207.6000	115.7000
MIN	5.4000	162.6000	22.1000	4.7000	12.2000	55.1000	9.5000	121.0000	130.0000	140.7000	65.1000

Linear Normalization MATRIX												
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**MAX**
A1	0.1628	0.1049	0.0000	0.0000	0.2077	0.0524	0.4225	0.7306	0.5350	0.4350	0.0395	0.7306
A2	0.8372	0.7465	1.0000	0.5814	0.6557	0.0048	0.5070	0.5433	0.7547	0.5800	0.1561	1.0000
A3	0.4884	0.6409	0.6614	0.5698	0.6913	0.0000	0.3803	0.5985	0.5898	0.4948	0.1897	0.6913
A4	0.0000	0.0000	0.0630	0.6279	0.6913	0.1762	0.6479	0.6280	0.5688	0.0000	0.2549	0.6913
A5	1.0000	0.4224	0.8268	0.8605	1.0000	0.6429	0.7465	1.0000	0.8792	0.7444	0.0000	1.0000
A6	0.6977	0.2083	0.7559	0.7674	0.6913	0.9238	1.0000	0.8089	0.9566	0.8326	0.2016	1.0000
A7	0.7907	1.0000	0.9370	0.8140	0.6858	0.6190	0.2535	0.6126	1.0000	1.0000	0.2549	1.0000
A8	0.5349	0.5441	0.8110	0.8837	0.6503	1.0000	0.5915	0.6581	0.9082	0.8550	0.3834	1.0000
A9	0.5116	0.7720	0.6772	0.9186	0.5683	0.7286	0.2676	0.4041	0.6689	0.8849	0.4348	0.9186
A10	0.2791	0.9570	0.4567	1.0000	0.5601	0.8238	0.0000	0.3637	0.4943	0.8356	0.5277	1.0000
A11	0.3023	0.6832	0.5512	0.7442	0.3552	0.8714	0.2535	0.2938	0.4012	0.7922	0.6146	0.8714
A12	0.1860	0.5200	0.4488	0.8837	0.3743	0.8048	0.3380	0.2014	0.2580	0.8356	0.7016	0.8837
A13	0.0000	0.2877	0.2598	0.7209	0.2732	0.4762	0.4366	0.0718	0.1542	0.6622	0.8123	0.8123
A14	0.0000	0.3518	0.3307	0.7674	0.2923	0.3381	0.4085	0.0321	0.1268	0.4589	0.8518	0.8518
A15	0.0698	0.8230	0.5512	0.6163	0.2049	0.3000	0.1549	0.0000	0.1472	0.7982	0.9170	0.9170
A16	0.1628	0.4771	0.5276	0.1279	0.0000	0.5095	0.4366	0.1103	0.0000	0.2451	0.7668	0.7668
A17	0.1395	0.6052	0.6929	0.5233	0.1339	0.6333	0.4366	0.0430	0.0270	0.5874	1.0000	1.0000

Vector Normalization MATRIX												
	C1	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**MAX**
A1	0.8831	0.8809	0.8994	0.8134	0.7878	0.9300	0.9251	0.9499	0.8923	0.9522	0.8758	0.9522
A2	0.9773	0.9663	1.0000	0.9219	0.9078	0.9265	0.9360	0.9151	0.9432	0.9644	0.8908	1.0000
A3	0.9285	0.9522	0.9659	0.9197	0.9173	0.9261	0.9196	0.9253	0.9050	0.9572	0.8952	0.9659
A4	0.8603	0.8670	0.9058	0.9306	0.9173	0.9391	0.9543	0.9308	0.9001	0.9153	0.9036	0.9543
A5	1.0000	0.9232	0.9826	0.9740	1.0000	0.9736	0.9671	1.0000	0.9720	0.9784	0.8706	1.0000
A6	0.9578	0.8947	0.9755	0.9566	0.9173	0.9944	1.0000	0.9644	0.9899	0.9858	0.8967	1.0000
A7	0.9708	1.0000	0.9937	0.9653	0.9159	0.9719	0.9031	0.9279	1.0000	1.0000	0.9036	1.0000
A8	0.9350	0.9393	0.9810	0.9783	0.9064	1.0000	0.9470	0.9364	0.9787	0.9877	0.9202	1.0000
A9	0.9318	0.9697	0.9675	0.9848	0.8844	0.9800	0.9049	0.8892	0.9233	0.9903	0.9269	0.9903
A10	0.8993	0.9943	0.9454	1.0000	0.8822	0.9870	0.8702	0.8816	0.8828	0.9861	0.9389	1.0000
A11	0.9026	0.9578	0.9549	0.9523	0.8273	0.9905	0.9031	0.8686	0.8613	0.9824	0.9501	0.9905
A12	0.8863	0.9361	0.9446	0.9783	0.8325	0.9856	0.9141	0.8515	0.8281	0.9861	0.9614	0.9861
A13	0.8603	0.9052	0.9256	0.9479	0.8054	0.9613	0.9269	0.8274	0.8040	0.9714	0.9757	0.9757
A14	0.8603	0.9138	0.9327	0.9566	0.8105	0.9511	0.9232	0.8200	0.7977	0.9542	0.9808	0.9808
A15	0.8701	0.9765	0.9549	0.9284	0.7871	0.9483	0.8903	0.8140	0.8024	0.9829	0.9893	0.9893
A16	0.8831	0.9304	0.9525	0.8373	0.7322	0.9638	0.9269	0.8345	0.7683	0.9361	0.9698	0.9698
A17	0.8798	0.9475	0.9691	0.9110	0.7681	0.9729	0.9269	0.8220	0.7746	0.9651	1.0000	1.0000
Adj Wj	0.0928	0.0902	0.0790	0.1043	0.1138	0.0729	0.0798	0.1048	0.1137	0.0596	0.0889	

CCM (Complete Compensatory Model)												
u1(ai)	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**SUM**
A1	0.0207	0.0130	0.0000	0.0000	0.0324	0.0052	0.0462	0.1048	0.0832	0.0355	0.0048	0.3458
A2	0.0777	0.0674	0.0790	0.0606	0.0747	0.0003	0.0405	0.0569	0.0858	0.0346	0.0139	0.5914
A3	0.0656	0.0837	0.0756	0.0859	0.1138	0.0000	0.0439	0.0907	0.0970	0.0427	0.0244	0.7234
A4	0.0000	0.0000	0.0072	0.0947	0.1138	0.0186	0.0748	0.0952	0.0935	0.0000	0.0328	0.5307
A5	0.0928	0.0381	0.0653	0.0897	0.1138	0.0469	0.0596	0.1048	0.0999	0.0444	0.0000	0.7555
A6	0.0648	0.0188	0.0597	0.0800	0.0787	0.0674	0.0798	0.0848	0.1087	0.0496	0.0179	0.7103
A7	0.0734	0.0902	0.0740	0.0849	0.0781	0.0452	0.0202	0.0642	0.1137	0.0596	0.0227	0.7262
A8	0.0497	0.0491	0.0641	0.0921	0.0740	0.0729	0.0472	0.0690	0.1032	0.0510	0.0341	0.7065
A9	0.0517	0.0758	0.0583	0.1043	0.0704	0.0579	0.0233	0.0461	0.0828	0.0574	0.0421	0.6700
A10	0.0259	0.0864	0.0361	0.1043	0.0638	0.0601	0.0000	0.0381	0.0562	0.0498	0.0469	0.5675
A11	0.0322	0.0707	0.0500	0.0890	0.0464	0.0729	0.0232	0.0353	0.0523	0.0542	0.0627	0.5891
A12	0.0195	0.0531	0.0401	0.1043	0.0482	0.0664	0.0305	0.0239	0.0332	0.0564	0.0706	0.5463
A13	0.0000	0.0320	0.0253	0.0925	0.0383	0.0428	0.0429	0.0093	0.0216	0.0486	0.0889	0.4421
A14	0.0000	0.0373	0.0307	0.0939	0.0391	0.0290	0.0383	0.0039	0.0169	0.0321	0.0889	0.4101
A15	0.0071	0.0810	0.0475	0.0701	0.0254	0.0239	0.0135	0.0000	0.0182	0.0519	0.0889	0.4275
A16	0.0197	0.0561	0.0544	0.0174	0.0000	0.0485	0.0454	0.0151	0.0000	0.0191	0.0889	0.3646
A17	0.0130	0.0546	0.0548	0.0546	0.0152	0.0462	0.0348	0.0045	0.0031	0.0350	0.0889	0.4047

UCM (Uncompensatory Model)												
u2(ai)	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**MAX**
A1	0.0721	0.0773	0.0790	0.1043	0.0815	0.0677	0.0337	0.0000	0.0304	0.0241	0.0841	0.1043
A2	0.0151	0.0229	0.0000	0.0436	0.0392	0.0726	0.0393	0.0479	0.0279	0.0250	0.0750	0.0750
A3	0.0272	0.0066	0.0034	0.0183	0.0000	0.0729	0.0359	0.0141	0.0167	0.0169	0.0645	0.0729
A4	0.0928	0.0902	0.0718	0.0096	0.0000	0.0544	0.0050	0.0096	0.0201	0.0596	0.0561	0.0928
A5	0.0000	0.0521	0.0137	0.0145	0.0000	0.0261	0.0202	0.0000	0.0137	0.0152	0.0889	0.0889
A6	0.0281	0.0714	0.0193	0.0242	0.0351	0.0056	0.0000	0.0200	0.0049	0.0100	0.0710	0.0714
A7	0.0194	0.0000	0.0050	0.0194	0.0358	0.0278	0.0596	0.0406	0.0000	0.0000	0.0663	0.0663
A8	0.0432	0.0411	0.0149	0.0121	0.0398	0.0000	0.0326	0.0358	0.0104	0.0086	0.0548	0.0548
A9	0.0411	0.0144	0.0208	0.0000	0.0434	0.0151	0.0566	0.0587	0.0309	0.0022	0.0468	0.0587
A10	0.0669	0.0039	0.0429	0.0000	0.0501	0.0129	0.0798	0.0667	0.0575	0.0098	0.0420	0.0798
A11	0.0606	0.0195	0.0290	0.0152	0.0674	0.0000	0.0566	0.0695	0.0613	0.0054	0.0262	0.0695
A12	0.0733	0.0371	0.0389	0.0000	0.0656	0.0065	0.0493	0.0809	0.0805	0.0032	0.0183	0.0809
A13	0.0928	0.0583	0.0537	0.0117	0.0756	0.0302	0.0369	0.0955	0.0921	0.0110	0.0000	0.0955
A14	0.0928	0.0530	0.0483	0.0103	0.0748	0.0440	0.0415	0.1009	0.0967	0.0275	0.0000	0.1009
A15	0.0858	0.0092	0.0315	0.0342	0.0884	0.0491	0.0663	0.1048	0.0954	0.0077	0.0000	0.1048
A16	0.0731	0.0341	0.0247	0.0869	0.1138	0.0245	0.0344	0.0897	0.1137	0.0406	0.0000	0.1138
A17	0.0799	0.0356	0.0243	0.0497	0.0986	0.0267	0.0450	0.1003	0.1106	0.0246	0.0000	0.1106

ICM (Incomplete Compensatory Model)												
u3(ai)	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**	**C7**	**C8**	**C9**	**C10**	**C11**	**MAX**
A1	0.9930	0.9930	0.9955	0.9837	0.9787	0.9983	0.9977	0.9997	0.9926	1.0000	0.9926	0.9272
A2	0.9979	0.9969	1.0000	0.9916	0.9890	0.9944	0.9947	0.9907	0.9934	0.9978	0.9898	0.9380
A3	0.9963	0.9987	1.0000	0.9949	0.9941	0.9969	0.9961	0.9955	0.9926	0.9995	0.9933	0.9587
A4	0.9904	0.9914	0.9959	0.9974	0.9955	0.9988	1.0000	0.9974	0.9934	0.9975	0.9952	0.9538
A5	1.0000	0.9928	0.9986	0.9973	1.0000	0.9981	0.9973	1.0000	0.9968	0.9987	0.9878	0.9677
A6	0.9960	0.9900	0.9980	0.9954	0.9902	0.9996	1.0000	0.9962	0.9989	0.9991	0.9904	0.9547
A7	0.9972	1.0000	0.9995	0.9963	0.9900	0.9979	0.9919	0.9922	1.0000	1.0000	0.9910	0.9569
A8	0.9938	0.9944	0.9985	0.9977	0.9889	1.0000	0.9957	0.9931	0.9976	0.9993	0.9926	0.9525
A9	0.9944	0.9981	0.9982	0.9994	0.9872	0.9992	0.9928	0.9888	0.9921	1.0000	0.9941	0.9456
A10	0.9902	0.9995	0.9956	1.0000	0.9858	0.9990	0.9890	0.9869	0.9859	0.9992	0.9944	0.9278
A11	0.9914	0.9970	0.9971	0.9959	0.9797	1.0000	0.9927	0.9863	0.9842	0.9995	0.9963	0.9228
A12	0.9901	0.9953	0.9966	0.9992	0.9809	1.0000	0.9940	0.9847	0.9803	1.0000	0.9977	0.9216
A13	0.9884	0.9933	0.9958	0.9970	0.9784	0.9989	0.9959	0.9829	0.9782	0.9997	1.0000	0.9119
A14	0.9879	0.9936	0.9960	0.9974	0.9785	0.9978	0.9952	0.9814	0.9768	0.9984	1.0000	0.9068
A15	0.9882	0.9988	0.9972	0.9934	0.9743	0.9969	0.9916	0.9798	0.9765	0.9996	1.0000	0.9006
A16	0.9913	0.9963	0.9986	0.9848	0.9685	0.9995	0.9964	0.9844	0.9739	0.9979	1.0000	0.8962
A17	0.9882	0.9951	0.9975	0.9903	0.9704	0.9980	0.9940	0.9797	0.9714	0.9979	1.0000	0.8880

											w1	w2	w3	
											0.6	0.1	0.3	
		CCM		φ	UCM		φ	ICM		φ	Utility Values			Rank Order
		u1(ai)	Rank	0.5	u2(ai)	Rank	0.5	u3(ai)	Rank	0.5				
2005	**A1**	0.3458	17	0.3263	0.1043	14	0.8709	0.9272	10	0.7548	0.5093	0.5093		**16**
2006	**A2**	0.5914	7	0.7182	0.0750	7	0.5496	0.9380	8	0.8018	0.7264	0.7264		**7**
2007	**A3**	0.7234	3	0.9207	0.0729	6	0.5173	0.9587	2	0.9663	0.8940	0.8940		**3**
2008	**A4**	0.5307	11	0.5758	0.0928	11	0.7361	0.9538	5	0.8821	0.6837	0.6837		**8**
2009	**A5**	0.7555	1	1.0000	0.0889	10	0.6914	0.9677	1	1.0000	0.9691	0.9691		**1**
2010	**A6**	0.7103	4	0.8838	0.0714	5	0.4900	0.9547	4	0.9087	0.8519	0.8519		**4**
2011	**A7**	0.7262	2	0.9513	0.0663	3	0.4300	0.9569	3	0.9371	0.8949	0.8949		**2**
2012	**A8**	0.7065	5	0.8542	0.0548	1	0.3431	0.9525	6	0.8565	0.8038	0.8038		**5**
2013	**A9**	0.6700	6	0.8015	0.0587	2	0.3740	0.9456	7	0.8287	0.7669	0.7669		**6**
2014	**A10**	0.5675	9	0.6499	0.0798	8	0.5971	0.9278	9	0.7744	0.6820	0.6820		**9**
2015	**A11**	0.5891	8	0.6907	0.0695	4	0.4625	0.9228	11	0.7345	0.6810	0.6810		**10**
2016	**A12**	0.5463	10	0.6101	0.0809	9	0.6267	0.9216	12	0.7182	0.6442	0.6442		**11**
2017	**A13**	0.4421	12	0.4833	0.0955	12	0.7755	0.9119	13	0.6980	0.5769	0.5769		**12**
2018	**A14**	0.4101	14	0.4184	0.1009	13	0.8276	0.9068	14	0.6832	0.5387	0.5387		**14**
2019	**A15**	0.4275	13	0.4509	0.1048	15	0.9017	0.9006	15	0.6698	0.5617	0.5617		**13**
2020	**A16**	0.3646	16	0.3513	0.1138	17	1.0000	0.8962	16	0.6601	0.5088	0.5088		**17**
2021	**A17**	0.4047	15	0.3988	0.1106	16	0.9564	0.8880	17	0.6502	0.5300	0.5300		**15**
	MAX	0.7555			0.1138			0.9677						

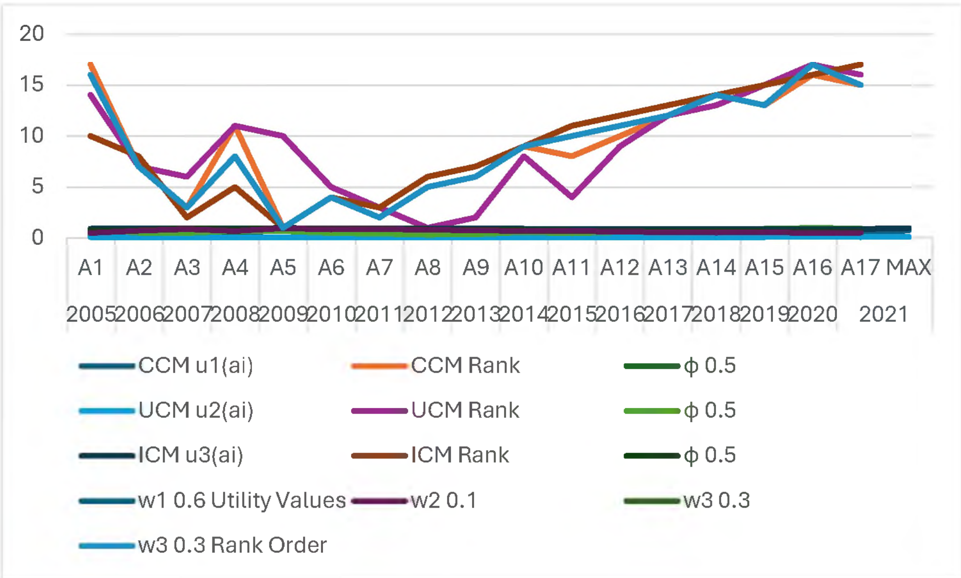

Figure 3. Rank Order

According to the results of the LMAW-DNMA method, the best external position of Serbia was in 2009. The following are: 2011, 2007, 2010, 2012, 2013, 2006, 2008, 2014, 2015, 2016, 2017, 2019, 2018, 2021, 2005, and 2020. The worst external position of Serbia was in 2020. There are numerous determinants of Serbia's external position.

CONCLUSIONS

According to the results of the LMAW-DNMA method, the best external position of Serbia was in 2009. The following are: 2011, 2007, 2010, 2012, 2013, 2006, 2008, 2014, 2015, 2016, 2017, 2019, 2018, 2021, 2005, and 2020. The worst external position of Serbia was in 2020.

Increasing the openness of Serbia's economy has a positive effect on its liquidity and solvency. This includes reducing exposure to financial risk.

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