TECHNIQUES OF ANALYSIS AND DIAGNOSTICS OF THE COMPANIES ON THE BASIS OF FINANCIAL INDEX

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Abstract

Not only banks do that and all the non-financial firms who want to check the solvability of a company. In this way there were created the scoring models. These models help the decided factors from a company to classify the companies and, depending of the score, to give or not the loan.

1. Introduction

On the market the companies work with a lot of financial institutions and also they went on the capital market too. All the companies do that because we all know that a company is a "live" system and it can not be isolated.

Experienced data analysts know that a successful analysis or meaningful report often requires more work in acquiring, merging, and transforming data than in specifying the analysis or report itself. SPSS contains powerful tools for accomplishing and automating these tasks.

2. The primary data used in paper

In the paper I used a representative sample of 15 companies from electrical domain. The information about these firms was taken from balance sheet of the end on 2006 year.

If we want to give a diagnosis of a company we have to calculate a lot of rates between the two positions of the balance sheet and/or the result account. Theoretical, and practical too, we can compute a lot of rates. For example:

a. rates of financial structure;

b. rates of liquidity and treasury - are rates of financial structure too but they express the potential of company for paying depts. on the short term;

c. profitability rates which are computed by using elements from the result account.

In the paper I made a classification of 15 companies, depending of the next economic-financial rates, computing from balance sheets:

I1: depts./social capital
I2: income/assets
I3: gross profit/assets
I4: social capital/income
I5:depts./assets
I6: the growth assets rate
I7: net profit/income

The primary data taken from the balance sheets of the sample of 15 firms are presented in the following table:

Firm	I1	I2	I3	I4	I5	I6	I7
ELECTRIC - AGK SRL	9.55	0.94	0.29	2.08	0.73	0.63	0.36
ELECTRICA SOLUZIONA SA	6.77	0.17	0.09	3.03	0.93	0.25	0.4
ETERN GRUP SRL	2.2	0.9	0	5.5	0.62	0.58	0.4
SC ENERGOMONTAJ SA	2.89	0.76	0.03	1.12	0.6	0.67	0.47
ELECTROMETAL INVEST SRL	1.24	0.65	0.09	1.3	1.06	0.6	0.43
SC ROMCONVERT SA	0.69	0.54	0.06	3.21	0.31	0.65	0.45
Digitech Electric	7.92	0.37	0.07	3.05	0.57	0.9	0.47
SC IMSAT CUADRIPOL SA	1.43	0.69	0.03	1.37	0.88	0.26	0.35
MATRIX ROM	3.96	0.86	0.18	4.04	0.61	0.35	0.37
TELEELECTRON	5.59	0.7	0.43	4.5	0.32	0.36	0.42
SBA INS S.R.L	4.33	0.5	0.55	2.9	0.7	0.57	0.48
PFGP	3.27	0.45	0.67	3.5	0.45	0.58	0.34
S.C. TECHINSTAL S.R.L.	0.81	0.23	0.23	3.67	0.56	0.37	0.52
S.C. VES ELECTRIC S.R.L.	1.65	0.34	0.53	2.43	0.23	0.45	0.39
LP ELECTRIC	2.5	0.56	0.98	1.9	0.24	0.48	0.41

Statistical Package for the Social Sciences (SPSS) is a comprehensive integrated software package for statistical data analysis. SPSS for Windows allows you to store data, perform transformations and analyses, and produce charts and graphs of results. Data are entered using a spreadsheet and results are displayed in a separate output window. The data and the output can be saved independently for the next work session. The output tables can be copied to a word processing application for inclusion in papers.

SPSS contains powerful tools for accomplishing and automating these tasks. While much of this capability is available through the graphical user interface, many of the most powerful features are available only through command syntax, the macro facility that extends the power of command syntax, and the scripting facility.

3. **Algorithms used in application**

The algorithm used to analyze and diagnostic firms or company through financial indicators is based on:

- Grouping those firms in unitary classes based on seven indicators. For this thing we will use an hierarchical aggregate algorithm.

a. Eigenvalues that offers informations about fitting quality are represented by specific falues of correlation matrix.

b. Factor Score Coefficients offers informations about principal axis.

- Grouping of those seven financial indicators in homogeneous classes. The start point is the primary data matrix, and then we calculate Euclidian distances between matrix columns.
- Based on scores matrix from SPSS output we find two indicators with high scores. With this two indicators we can catalogue the studied firms based on scoring values we obtain.

The purpose of classifying methods and cluster analysis is grouping of individuals, identified by a series of attributes-numeric variables-into a restraint number of unitary classes.

What characterizes those classes is the fact that they make a global analysis of the individuals that are studied through a large number of variables, and the suppositions are minim. The purpose of classifying is not only the individuals (data matrix rows) but also the variables (data matrix columns).

We what to make classes (groups) in a way that individuals belonging to a same group, to be very similar between them through variables values, but the build groups to be as different as possible.

The cluster analysis implies two steps:

- picking an proximity measure, defining an ‘approach’ measure between individuals based on observed variables, to be precise;

- elaboration of certain rules regarding the construction of classes in a way that the difference between them be as large as possible, and the individuals from this groups to as closer as possible.

3.1 Principal component analysis-firm classification

The purpose of principal component analysis is that for a X matrix to identify new variables that should synthetic explain the old variables so that the quantity of information to be lost in a controlled mode.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.712	24.461	24.461	1.712	24.461	24.461	1.587	22.677	22.677
2	1.453	20.761	45.222	1.453	20.761	45.222	1.480	21.143	43.820
3	1.263	18.048	63.270	1.263	18.048	63.270	1.299	18.554	62.374
4	1.063	15.179	78.449	1.063	15.179	78.449	1.125	16.075	78.449
5	0.917	13.096	91.544						
6	0.346	4.945	96.489						
7	0.246	3.511	100.000						

The Total Variance Explained table from above offers informations about intrinsec values of the correlation matrix, quantity of recovered information form each factorial axix. We can se that after four factors we stoped because the maximum quantity of information was recovered.

The Component Score Coefficient Matrix table offers information about axis versors $u^* = (u_1^*, u_2^*, ..., u_p^*)$. A versor is a vector with norm equal with 1 that gives the direction of factorial axis. The versor elements give us the percentage which each variable participate in the new component.

	Component			
	1	2	3	4
I1	-0.034	0.323	0.432	-0.023
I2	0.102	0.471	0.161	0.145
I3	-0.610	0.083	-0.014	-0.232
I4	0.059	0.034	-0.052	0.864
I5	0.489	0.069	-0.108	-0.263
I6	-0.053	-0.077	0.706	-0.049
I7	0.133	-0.579	0.222	0.099

We notice that I4 row has the highest score in the 4 column (0,864), and I3 row the lowest score in the first column (-0,610).

The Euclidian distance is a measure of dissimilarly between firms. If this is at a higher level means that the companies are very different. Proximity parameter shows the approaching or difference that exist between two individuals from the data matrix when we take in consideration all variables related to entities(firms).

To reflect as good as possible the real world we used in the analysis the square of Euclidian distances.

Case	Absolute Squared Euclidean Distance															
	1:Case 1	2:Case 2	3:Case 3	4:Case 4	5:Case 5	6:Case 6	7:Case 7	8:Case 8	9:Case 9	10:Case 10	11:Case 11	12:Case 12	13:Case 13	14:Case 14	15:Case 15
1:Case 1	0.000	0.443	7.931	0.298	4.932	10.72	0.239	3.588	2.942	1.866	1.129	3.271	10.46	5.372	1.911
2:Case 2	0.443	0.000	5.393	0.502	3.301	7.982	0.107	2.139	1.393	0.714	0.240	1.615	7.506	3.260	1.104
3:Case 3	7.931	5.393	0.000	6.758	3.099	0.411	6.032	2.699	1.546	2.639	3.710	1.561	0.428	0.705	3.806
4:Case 4	0.298	0.502	6.758	0.000	3.495	9.327	0.293	2.525	2.355	1.623	1.056	2.955	9.377	4.886	2.278
5:Case 5	4.932	3.301	3.099	3.495	0.000	4.618	3.906	0.520	2.235	3.040	3.045	3.093	4.467	3.861	5.180
6:Case 6	10.72	7.982	0.411	9.327	4.618	0.000	8.576	4.638	3.334	4.696	6.015	3.202	0.225	1.718	5.923
7:Case 7	0.239	0.107	6.032	0.293	3.906	8.576	0.000	2.774	1.783	0.948	0.422	1.974	8.320	3.708	1.211
8:Case 8	3.588	2.139	2.699	2.525	0.520	4.638	2.774	0.000	1.127	1.703	1.843	2.022	4.401	2.895	3.410
9:Case 9	2.942	1.393	1.546	2.355	2.235	3.334	1.783	1.127	0.000	0.199	0.576	0.190	3.140	0.683	0.983
10:Case 10	1.866	0.714	2.639	1.623	3.040	4.696	0.948	1.703	0.199	0.000	0.150	0.265	4.431	1.085	0.418
11:Case 11	1.129	0.240	3.710	1.056	3.045	6.015	0.422	1.843	0.576	0.150	0.000	0.635	5.621	1.827	0.507
12:Case 12	3.271	1.615	1.561	2.955	3.093	3.202	1.974	2.022	0.190	0.265	0.635	0.000	2.889	0.340	0.657
13:Case 13	10.46	7.506	0.428	9.377	4.467	0.225	8.320	4.401	3.140	4.431	5.621	2.889	0.000	1.485	5.550
14:Case 14	5.372	3.260	0.705	4.886	3.861	1.718	3.708	2.895	0.683	1.085	1.827	0.340	1.485	0.000	1.511
15:Case 15	1.911	1.104	3.806	2.278	5.180	5.923	1.211	3.410	0.983	0.418	0.507	0.657	5.550	1.511	0.000

When we want to evaluate the vicinity among individuals from different classes we can use many techniques. The more distant neighbor method require that the distance between two classes to be assimilated with the distance between the more distant element (elements will be from different classes).

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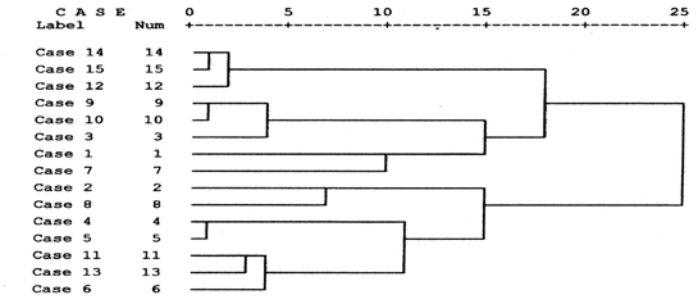
Dendrogram using Complete Linkage

Rescaled Distance Cluster Combine



From the SPSS output dendogram results that we can form many classes depending on its 'cut'. If the 'cut' is between 15 and 20 we can form 3 classes: (12,15,14); (9,10,3,1,7) and (2,8,4,5,11,13,6). The most convenient situation is when the 'cut' is situated between 20 and 25, when we can form 2 classes: (14,15,12,9,10,3,1,7) and (2,8,4,5,11,13) because this is the purpose of the analysis.

3.2 Classification of financial indicators

We obtain above two classes of firms suitable for: firms with good financial situation and for firms with inferior financial situation. Applying the same method of classification for the indicators we obtain the following informations:

- initial data

	f1	f2	f3	f4	f5	f6	f7	f8	f9	f10	f11	f12	f13	f14	f15
I1	9.55	6.67	2.2	2.89	1.24	0.69	7.92	1.43	3.96	5.59	4.33	3.27	0.81	1.65	2.5
I2	0.94	0.17	0.9	0.76	0.65	0.54	0.37	0.69	0.86	0.7	0.5	0.45	0.23	0.34	0.56
I3	0.29	0.09	0	0.03	0.09	0.06	0.07	0.03	0.18	0.43	0.55	0.67	0.23	0.53	0.98
I4	2.08	3.03	5.5	1.12	1.3	3.21	3.05	1.37	4.04	4.5	2.9	3.5	3.67	2.43	1.9
I5	0.73	0.93	0.62	0.6	1.06	0.31	0.57	0.88	0.61	0.32	0.7	0.45	0.56	0.23	0.24
I6	0.63	0.25	0.58	0.67	0.6	0.65	0.9	0.26	0.35	0.36	0.57	0.58	0.37	0.45	0.48
I7	0.36	0.4	0.4	0.47	0.43	0.45	0.47	0.35	0.37	0.42	0.48	0.34	0.52	0.39	0.41

- the dendogram

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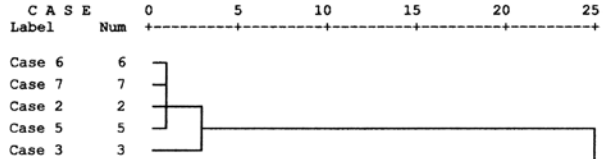
Dendrogram using Complete Linkage

Rescaled Distance Cluster Combine

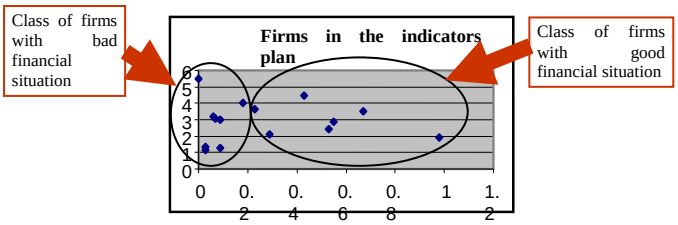


From the dendogram we can observe that the studied indicators are grouped in two classes: first class is obtained form indicator 1 and 4 and the second class include the following indicators: 6, 7, 2, 5 and 3.

3.3 Taking decisions regarding SPSS outputs

For analysis we take two indicators: I3 (gross income/total asset) and I4 (registered capital/turnover). If a company has a good value for I3 and a bad value for I4 then this firm is has a good profitability, otherwise this firm is not going to well form financial point of view.

Firm	I3(profit indicator)	I4	Firm status
1	0.29	2.08	F
2	0.09	3.03	F
3	0	5.5	F
4	0.03	1.12	F
5	0.09	1.3	F
6	0.06	3.21	F
7	0.07	3.05	F
8	0.03	1.37	F
9	0.18	4.04	B
10	0.43	4.5	B
11	0.55	2.9	B
12	0.67	3.5	B
13	0.23	3.67	B
14	0.53	2.43	B
15	0.98	1.9	B



The I4 indicator being aggregated by division of gross income at total assets, shows if a firm has profit. If this ratio is grater this means that the company is doing very well. The I3 indicator aggregated by division of registered capital at turnover, shows if a firm has loses or not. If this ratio is smaller the status of the company is good and if this ratio is grater the firm will enter in bankrupt.

4. Conclusion

After marking all the samples from the studied firms we can observe by looking on graphic how those companies are distributed. If a certain bank wants to give a credit to a company will have to verify if the firm is solvent or if he can guarantee for the credit. Not only banks should make this verification, but also non-banking institutions should verify if a company is solvent or not. After we apply the classification of companies methods we can make decisions at tactical and strategically level.

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