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:

<table>
<thead>
<tr>
<th>Rate</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1: depts./social capital</td>
<td></td>
</tr>
<tr>
<td>I2: income/assets</td>
<td></td>
</tr>
<tr>
<td>I3: gross profit/assets</td>
<td></td>
</tr>
<tr>
<td>I4: social capital/income</td>
<td></td>
</tr>
<tr>
<td>I5: depts./assets</td>
<td></td>
</tr>
<tr>
<td>I6: the growth assets rate</td>
<td></td>
</tr>
<tr>
<td>I7: net profit/income</td>
<td></td>
</tr>
</tbody>
</table>

The primary data taken from the balance sheets of the sample of 15 firms are presented in the following table:
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.
  - Eigenvalues that offers informations about fitting quality are represented by specific values of correlation matrix.
  - 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.

The Total Variance Explained table from above offers informations about intrinsec values of the correlation matrix, quantity of recovered information form each factorial axis. We can see 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.

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.
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).

**HIERARCHICAL CLUSTER ANALYSIS**

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); (9,10,3,17) 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: (14,15,12,9,10,3,17) 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

```
   0  5  10  15  20  25
Case  6  6  6  6  6  6
        0  0  0  0  0  0
Case  7  7  7  7  7  7
        0  0  0  0  0  0
Case  2  2  2  2  2  2
        0  0  0  0  0  0
Case  5  5  5  5  5  5
        0  0  0  0  0  0
Case  3  3  3  3  3  3
        0  0  0  0  0  0
Case  6  6  6  6  6  6
        0  0  0  0  0  0
```

- the dendogram

```
  0  5  10  15  20  25
Case  6  6  6  6  6  6
        0  0  0  0  0  0
Case  7  7  7  7  7  7
        0  0  0  0  0  0
Case  2  2  2  2  2  2
        0  0  0  0  0  0
Case  5  5  5  5  5  5
        0  0  0  0  0  0
Case  3  3  3  3  3  3
        0  0  0  0  0  0
```
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.

<table>
<thead>
<tr>
<th>Firm</th>
<th>I3 (profit indicator)</th>
<th>I4</th>
<th>Firm status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.29</td>
<td>2.08</td>
<td>F</td>
</tr>
<tr>
<td>2</td>
<td>0.09</td>
<td>3.03</td>
<td>F</td>
</tr>
<tr>
<td>3</td>
<td>6.5</td>
<td>6.5</td>
<td>F</td>
</tr>
<tr>
<td>4</td>
<td>1.12</td>
<td>1.12</td>
<td>F</td>
</tr>
<tr>
<td>5</td>
<td>1.3</td>
<td>1.3</td>
<td>F</td>
</tr>
<tr>
<td>6</td>
<td>3.21</td>
<td>3.21</td>
<td>F</td>
</tr>
<tr>
<td>7</td>
<td>3.05</td>
<td>3.05</td>
<td>F</td>
</tr>
<tr>
<td>8</td>
<td>1.17</td>
<td>1.17</td>
<td>F</td>
</tr>
<tr>
<td>9</td>
<td>4.04</td>
<td>4.04</td>
<td>B</td>
</tr>
<tr>
<td>10</td>
<td>4.5</td>
<td>4.5</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>2.9</td>
<td>2.9</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>3.5</td>
<td>3.5</td>
<td>B</td>
</tr>
<tr>
<td>13</td>
<td>3.67</td>
<td>3.67</td>
<td>B</td>
</tr>
<tr>
<td>14</td>
<td>2.43</td>
<td>2.43</td>
<td>B</td>
</tr>
<tr>
<td>15</td>
<td>1.9</td>
<td>1.9</td>
<td>B</td>
</tr>
</tbody>
</table>

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.

References:


[16] www.portal-electric.ro