

CLASSIFICATION OF THE MAIN FINANCIAL - BANKING INSTITUTIONS IN ROMANIA USING SAS

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Abstract

In this research we started from the analysis of the financial actors on the Romanian market, the values of the net assets and equity indicators were registered and, depending on these, the financial institutions were grouped. The software's used were: Statistical Analysis System (Data Miner), SAS Enterprise Guide and Microsoft Office Excel 2019. Thus, financial institutions with foreign or state capital were aggregated in two main classes, depending on the performance indicators studied. Apart from this, two outliers were found which could not be attached to any class. Furthermore, a comparative analysis was performed over a period of 10 years (2009 - 2019) of these two outliers to study in detail why they could not be added to any found class.

Keywords: SAS, banking, data mining, strategy, classification, Enterprise Guide

JEL Classification: C38, C32, E49, P34

1. Introduction

The accentuation of the competition on the Romanian banking market, the increase of the quality of the products and services offered, as well as an experience that can no longer be neglected, represented as many premises that emphasized the importance and the growing need to adopt pertinent strategies by the banking players in the market.

Along with the ability to be recognized and associated, from an institutional point of view, by customers with attributes that determine them to make a choice (trust, security, tradition, speed and others), each bank has its own way of being anchored in the respective banking landscape.

In the perspective of changing the approach of banks from the orientation to products and services, to the customers they address, to the target, to which are added the new banking regulations that amplify the need to closely monitor customer performance, automate banking processes, diversification of distribution channels, banks were determined to be interested in developing high-performance strategies in relation to customers.

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Under the dominance of the globalization of the economy, the pace and need for change increase, the life cycles of the company, of the products it offers and of the strategies it promotes become shorter and shorter. Under these conditions, a new way is needed to define and operationalize the company's strategy, materialized in the continuous development of the strategy - both in its conceptual and operational side - based on a coherent and clear vision of the company's mission. This will allow the bank to constantly adapt to changes in its environment (by integrating positive deviations and avoiding or neutralizing / reducing the effects of negative ones), as well as adopting a proactive attitude, anticipating environmental challenges, transforming them into opportunities and capitalizing on them.

2. Defining the problem, data and coding of the indicators

In this research, the main actors of the Romanian banking market from 2019 were analyzed in terms of performance indicators, such as net assets and equity. It is known that when implementing the long-term management strategy within an economic agent, it must take into account several factors, including existing financial partners. Thus, a robust analysis of them and the determination of their aggregation is necessary.

The data on the most important banking institutions in Romania were taken from the public reports provided by the National Bank of Romania, but also from the own reports of each bank. The data were taken over for the period 2009-2019, the cluster analysis was performed only for 2019, and the banks resulting from the analysis for 2019 were analyzed in terms of time series 2010-2019.

The table below (Table 1) presents the initial data that formed the basis of the analysis. The main indicators considered in making the comparison between the individuals of the bank population were: net assets (I1) and the equity (I2). For these two indicators, values were recorded both in absolute value and in percentage.

Table no 1. Initial values for the data sample for 2019

Bank Name	I1	I1%	I2	I2%
CEC Bank	32897.80	6.64	3861.10	8.17
Export-Import Bank of Romania - Eximbank	7750.90	1.57	1074.60	2.28
Transilvania Bank	87740.70	17.72	8328.80	17.63
Creditcoop Central Cooperative Bank	1474.10	0.30	310.60	0.66
Railway Commercial Bank	463.10	0.09	38.40	0.08
Romanian Bank for Loans and Investments	165.80	0.03	42.30	0.09
Romanian Commercial Bank	71450.00	14.44	7724.80	16.36
BRD - Soci�t� G�n�rale Group	55853.30	11.28	5793.20	12.27
UniCredit Bank	44541.20	8.99	4872.60	10.32
Raiffeisen Bank	42876.30	8.66	4687.80	9.93
Alpha Bank	17820.50	3.60	1910.70	4.05
OTP Bank	13252.70	2.68	1594.20	3.37
Garanti Bank	10870.20	2.19	1298.40	2.75
Banca Romaneasca member of the National Bank of Greece Group	6646.80	1.34	971.00	2.06
First Bank (Piraeus)	6417.10	1.30	804.40	1.70

Intesa SanPaolo Comercial Bank	6582.90	1.33	794.30	1.68
Libra Internet Bank	6527.00	1.32	657.30	1.39
Credit Europe Bank	4031.20	0.81	742.70	1.57
Patria Bank	3193.80	0.64	326.20	0.69
BCR Housing Bank	2653.30	0.53	57.00	0.12
Idea Bank	2337.30	0.47	215.10	0.45
Vista Bank (Marfin)	2580.20	0.52	309.10	0.65
Crédit Agricole Bank	2353.70	0.47	213.50	0.45
ProCredit Bank	1803.60	0.36	216.80	0.46
Leumi Bank	1318.80	0.27	189.10	0.40
Porsche Bank	831.60	0.17	174.30	0.37
Aedificium Housing Bank	399.40	0.08	21.70	0.05

The net assets represents the difference between total assets and total liabilities and corresponds to equity. [11] This indicator is used to estimate the value of a company and represents the amount that the shareholders / associates of the entity would receive in case of liquidation (ie what remains from the capitalization of the asset, after the payment of debts). [12] The net balance sheet asset does not fully reflect the market value of a company, but is a starting point for such an estimate.

According to the Regulation no. 18 of 14. dec. 2006 on the own funds of credit institutions and investment companies published by the National Bank of Romania, the own funds of credit institutions and respectively of a credit cooperative network are formed by funds level 1 own funds and level 2 own funds. [13] The own funds of the Romanian branches of credit institutions from third countries are represented by the level 1 own funds.

Level 1 own funds include: the subscribed and paid-in share capital, except for cumulative preferred shares or, as the case may be, the endowment capital made available to the Romanian branch by the credit institution from the third state; capital premiums, fully collected, related to the share capital; legal, statutory and other reserves, as well as the positive carry-forward result of previous financial years, remaining after profit distribution; the net profit of the last financial year, carried forward until its distribution according to the destinations established by the general meeting of shareholders.

Level 2 own funds consist of: basic level 2 own funds (reserves from revaluation of property, plant and equipment, adjusted for related tax liabilities, foreseeable at the date of calculation of own funds; open-ended securities and other instruments of the same nature; other items) and additional tier 2 equity (fixed-term cumulative preference shares and subordinated loan capital).

The component elements of own funds must be able to be used at any time and with priority to absorb losses, not involve fixed costs for the credit institution and be effectively made available to it, respectively be fully paid.

3. The research methodology

The methodology used in the application has the following structure:

- we built an initial data matrix with indicators I1 and I2 expressed as a percentage. We have given up the use of these two indicators in absolute value because only in

percentage value can the best differences between the members of the bank population be identified.

- the advanced data mining techniques were applied to the previously built matrix: cluster analysis, classification of banks into various groups. The application was developed in the Statistical Analysis System (SAS) software and SAS Enterprise Guide. The grouping of banks, the number of possible groups and, possibly, outlier members were identified.

- a comparative analysis of the banks that did not join any group was performed. This analysis was performed using Microsoft Office Excel 2019.

4. Results and discussions

After the data sample was loaded into SAS software, a first analysis was performed in terms of data homogeneity, so indicators such as (figure 1) were calculated: minimum value, maximum value, standard deviation from average, skewness, kurtosis. The data sample was also checked and if missing values were found, in this case they would have been removed from the analysis.

Name	Min	Max	Mean	Std Dev.	Missing %	Skewness	Kurtosis
I1_	0.03	17.72	3.2517	4.8073	0%	1.8612	2.672
I2_	0.05	17.63	3.7037	5.1428	0%	1.6737	1.7526

Figure 1. Descriptive statistics of the sample

Skewness is used to determine a distribution's deviation, if exists, from the normal distribution and indicates the direction and relative magnitude of the entire series. In our case for the indicator I1 a skewness of 1.86 was calculated, and for the indicator I2 its value was 1.67.

Kurtosis is an indicator that provides user the information about the existence of some outliers in the data set. The higher its value, the more problems there will be in terms of the number of outliers in the data set. For the studied data sample (figure 1) it can be seen that the value for I1 is 2.67, and for I2 we have 1.75. The values for kurtosis are not very high, there is the possibility of outliers, but they will not have a special influence, so they can be removed from the analysis.

After the descriptive analysis of the data, the clustering method was established. Thus, we chose the ward method to perform the cluster analysis, and the clustering criterion was the least squares. The Ward method allows segmenting the data sample into different classes, so that the classes are as homogeneous as possible inside and as different as possible from each other.

The least squares method involves finding the parameters of the regression function by making the condition that the sum of the squares of the distances between the graph of the function and each observed variable be minimal.

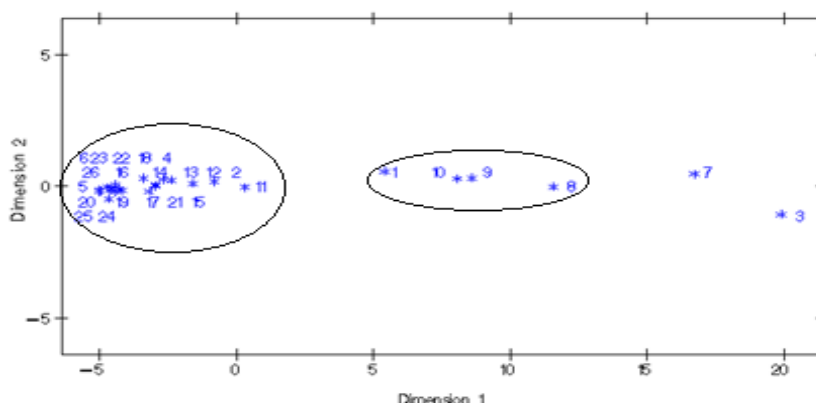


Figure 2. Cluster proximities of the sample of data

After the analysis performed with the help of the SAS program, it can be observed that the following results were obtained (figure 2):

- class 1 consisting of observations: 1, 10, 9 and 8 (CEC Bank, UniCredit Bank, Raiffeisen Bank and Alpha Bank)

- class 2 consisting of observations: 2, 4, 5, 6, 11-24 (Export-Import Bank of Romania - Eximbank, Creditcoop Central Cooperative Bank, Railway Commercial Bank, Romanian Bank for Loans and Investments, OTP Bank, Garanti Bank, Banca Romaneasca member of the National Bank of Greece Group, First Bank (Piraeus), Intesa SanPaolo Comercial Bank, Libra Internet Bank, Credit Europe Bank, Patria Bank, BCR Housing Bank, Idea Bank, Vista Bank (Marfin), Crédit Agricole Bank, ProCredit Bank, Leumi Bank, Porsche Bank, Aedificium Housing Bank)

- observations 7 (Romanian Commercial Bank) and 3 (Transilvania Bank) are outliers. They cannot be associated in a different class because the distance between them is too big for such an association, and the distance between the farthest point in class 1 (observation 8) and the nearest outlier (observation 7) is approximately equal. with the distance between the two outliers.

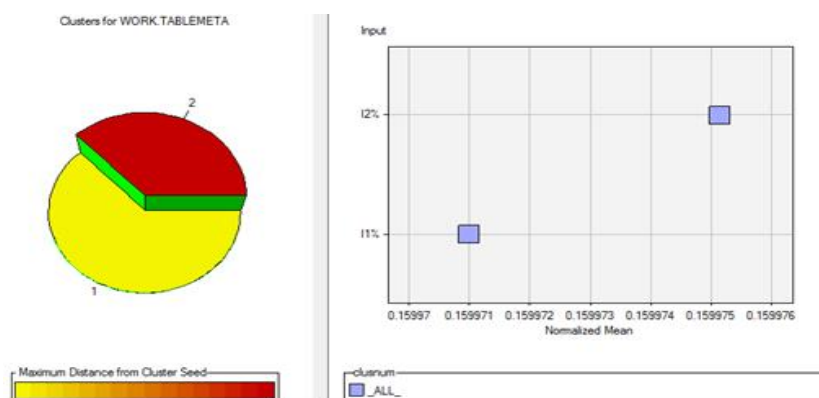


Figure 3. Clusters after removing outliers

After the outliers are eliminated, it will be confirmed that only 2 relatively homogeneous groups of banks will remain (figure 3).

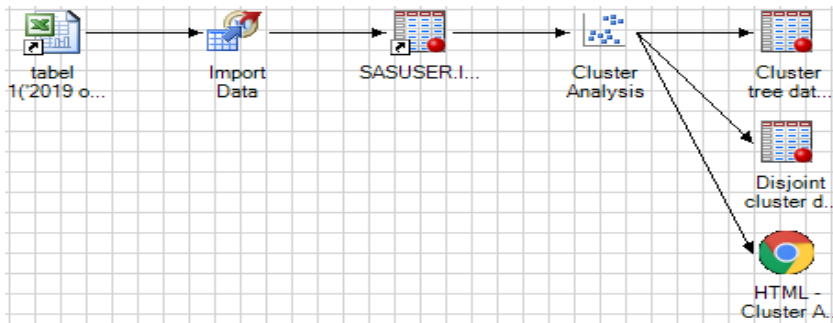


Figure 4. Process flow of the new data set from the SAS Enterprise Guide

After removing the two outliers from the initial data set, the analysis is repeated using the same algorithms according to the process flow from figure 4. Thus, the data series is reanalyzed and the two classes are obtained, as it can be seen in the dendrogram resulting from the SAS Enterprise Guide program (figure 5).

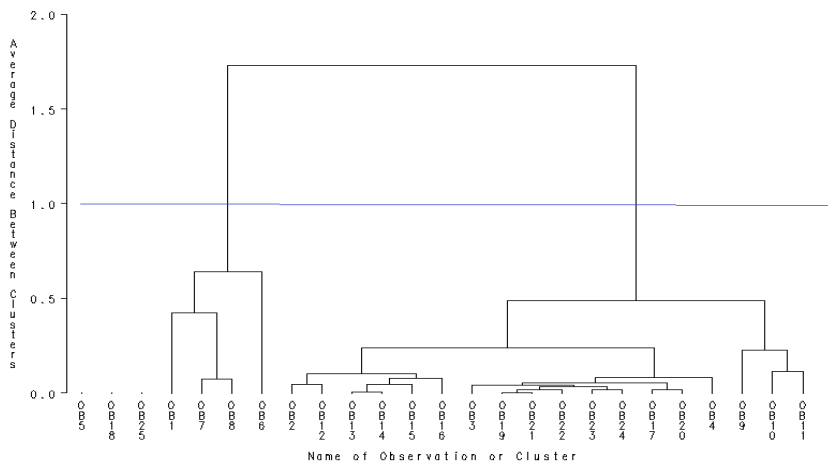


Figure 5. Cluster tree data from SAS Enterprise Guide

The data series was reanalyzed, after the two outliers were eliminated, using the same clustering algorithm (ward) and both the number of classes initially made and, somewhat, their structure were preserved. With the re-sampling of a series of data by removing certain values, it is noticed that all the observations could not be linked to a certain class. This is due to the fact that the values of these observations were much too low, so they were eliminated from the start of the analysis (OB5, OB15 and OB25). But, looking at the graph from the figure 6, these observations that could not be associated with a class by the SAS Enterprise Guide can be assimilated to the class with the most observations, thus obtaining the two classes initially resulting from the SAS program.

According to the proposed research methodology, the two outliers will be further analyzed using the Microsoft Office Excel program.

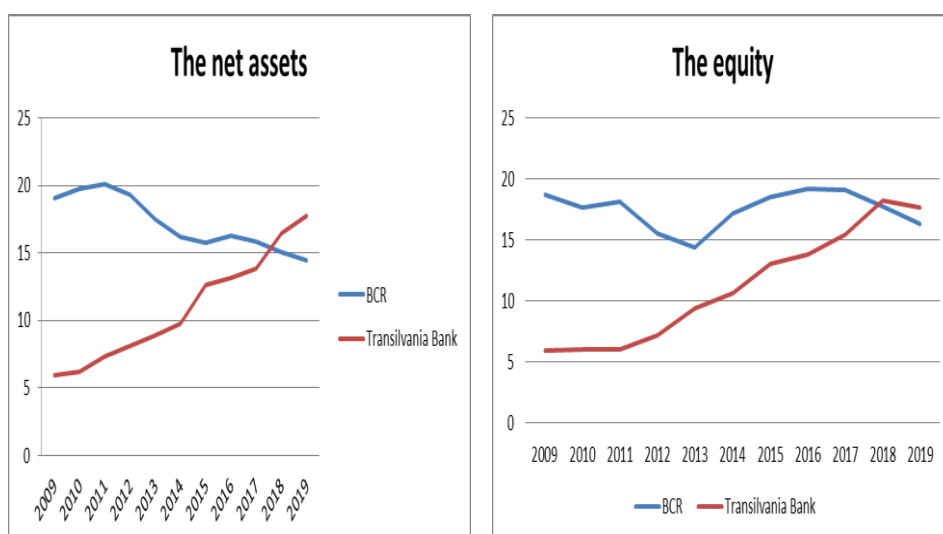


Figure 6. The evolution of the percent of the net assets and the equity in the period 2009-2019

One of the important players on the Romanian banking market was the Transylvania Bank, over time it has managed to maintain its top position, but also to implement the rules, directives or regulations imposed by the National Bank of Romania. In this sense, it changed its internal rules and changes took place in the organizational framework. Since 2009, the bank has started a process of growth and adaptation of their business system meant to face the challenges of the financial crisis.

An essential moment in the evolution of Transylvania Bank is the beginning of 2015, when it acquired by merger of Volksbank Romania. The bank considers that the defining elements that made it acquire Volksbank Romania are: the benefit brought in terms of development and stabilization strategy, the large number of customers and an important portfolio of retail loans, as well as the fact that their business system was close and sharing the same market.

An important moment for the evolution of Transylvania Bank is also the year 2018 when it managed to carry out a new merger of Bancpost Bank. Thus, with the experience already had, this represented a real success, the bank continuing the approach in supporting entrepreneurs, SMEs, but also projects of individuals. Also this year, Transylvania Bank became the third shareholder of Victoriabank in the top of the banks in the Republic of Moldova and together with the EBRD (European Bank for Reconstruction and Development) having a share of 66%.

As a result of these acquisitions and successes, Transylvania Bank manages to gain a position on the market and to maintain in an increasing trend its net assets and equity, managing to obtain on the financial-banking market in Romania the second place in the ranking.

On the other hand, Commercial Romanian Bank maintained its first position throughout the research period. It managed to align with the norms, regulations imposed by the National Bank of Romania, introducing when the situation was imposed by certain corporate governance directives, thus constituting the necessary framework to be able to delimit the monitoring and management function.

Although the total number of loans allocated by the bank increased by 8%, and 34% of the amount of capital for the First House program was distributed to Romanian Commercial Bank for 2019, customer deposits were increased and a special emphasis was placed on was put on the efficiency of the means of digitization, however it was affected, as it can be seen from figure 7 the own capitals start to decrease.

We can therefore say that, although it had a good operational result, its positive return in all business directions, its equity and net profit decreased.

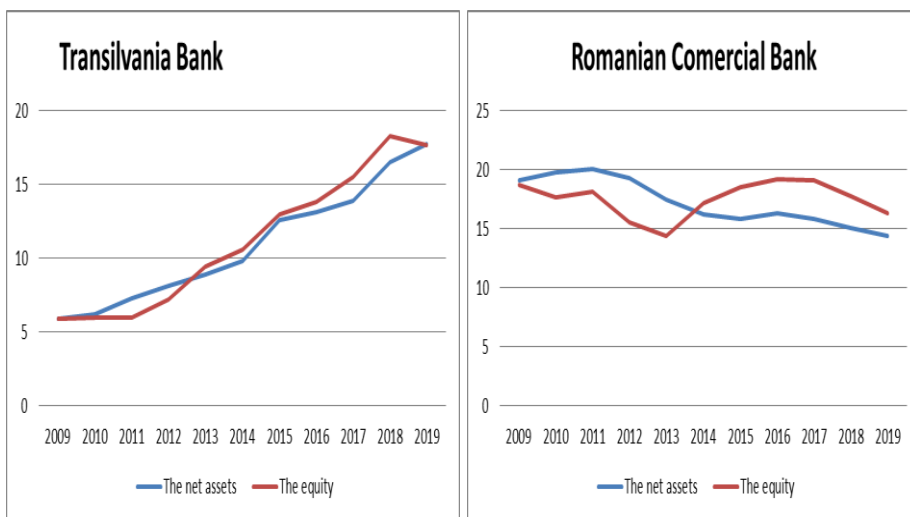


Figure 7. The evolution of the net assets and the equity from the Transilvania Bank and RCB in the period 2009-2019

Each bank has a unique purpose or reason to be, a uniqueness that must be reflected in its mission / vision statement. Well-formulated mission / vision statements are essential for the subsequent formulation, implementation and evaluation of the strategy, although too often they are not sufficiently taken into account. In the absence of a clear funding of the bank's mission, its short-term actions may harm long-term interests. The bank's mission / vision statements should be constantly evaluated and updated, but in general, well-made statements do not undergo major changes, often resisting the passage of time.

The objectives are essential for the organizational success as they establish the direction of the bank's evolution, help to evaluate the performances, generate synergy, reveal priorities, focus on coordination, provide the foundation for effective planning, organization, motivation and control activities. Objectives must be stimulating, measurable, consistent, reasonable and clear. In a multidimensional bank, the objectives will have to be set both for its global level and for each division (strategic business unit).

The strategic management cumulates the actions of conception, implementation and systematic use of a strategy for fulfilling the objectives assumed by the bank, according to their mission and vision, having the following basic characteristics:

- the global approach of the bank considered as an open system, in continuous correlation with its external environment, in continuous dynamic interdependence between the potential and its own actions on the one hand, and the competition, customers, suppliers, on the other hand;
- the voluntary, anticipatory and proactive attitude of the managers regarding the establishment of the objectives and the means to achieve them; the strategic objectives are chosen a priori, based on analyzes, evaluations and forecasts of the evolution of the main influencing factors and are kept up to date by systematic monitoring;
- permanent focus on achieving the objectives and allocating in this sense the necessary resources (physical, material, human and informational);
- giving priority to long-term decisions and their rapid implementation.

Strategic management is carried out within the general context provided by the bank's mission, and its fundamental task is precisely to ensure that the mission is correctly defined and relevant to the bank's fundamental purpose in its ever-changing environment. But strategic management is concerned with both goals and means. In terms of purpose, he formulates an image / vision of how the bank will look in the future, and in terms of means, he shows how he expects that image / vision to become a reality. Strategic management is therefore a visionary management, concerned with creating and conceptualizing ideas on the evolution of the bank. But, it must be translated into an empirical management, which decides how to get there practically.

5. Conclusion

In the long run, competitiveness is given by the ability to build, at lower costs than competitors and faster than them, the distinctive skills that increase results unexpectedly. The real sources of advantage must be in the ability of management to integrate technologies and production skills into the skills that allow the bank to adapt quickly to the changing environment. Distinctive competencies refer both to the harmonization and integration of different technology flows, and to the organization of work and value creation. They do not diminish through use but, on the contrary, unlike physical assets, which lose their value over time, they become stronger as they adhere to them and apply them.

Strategies cover a wide variety depending on the constraints imposed, on the one hand, by the external environment in which they evolve, as well as on the characteristics of banks in terms of size, financing capacity, research and development, market position, on the other hand. Strategies serve as a foundation for the implementation of policies, programs and rules by the bank.

References

1. Alistair Stewart, Chapter 7.4 - SAS, Editor(s): Zuzana Obertová, Alistair Stewart, Cristina Cattaneo, Statistics and Probability in Forensic Anthropology, Academic Press, 2020, Pages 383-390, ISBN 9780128157640, <https://doi.org/10.1016/B978-0-12-815764-0.00030-7>
2. Armstrong, M., *How to be an even better manager*, Kogan Page Limited, 1994.
3. Băcanu, B., *Management strategic*, Editura Teora, București, 1997, p. 21.
4. Koti Neha, M Yogi Reddy (2020), A Study On Applications Of Data Mining, INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 9, ISSUE 02, FEBRUARY 2020 ISSN 2277-8616.
5. Młodak, A. (2020), k-Means, Ward and Probabilistic Distance-Based Clustering Methods with Contiguity Constraint, *Journal of Classification*, <https://doi.org/10.1007/s00357-020-09370-5>
6. Voican, Oona (2020), Using data mining methods to solve classification problems in financial-banking institutions, *Economic Computation & Economic Cybernetics Studies & Research*, Vol. 54 Issue 1, p. 159-176.
7. <https://www.bancatransilvania.ro/>
8. <http://legislatie.just.ro/Public/DetaliuDocument/171604>
9. <https://www.contzilla.ro/activul-net-contabil-2/>
10. <https://www.bnr.ro/apage-Mobile.aspx?pid=404&actId=50>
11. https://www.bnr.ro/files/d/Legislatie/EN/E_R_22_27.pdf
12. https://www.bnr.ro/files/d/Legislatie/EN/E_R_18_23.pdf
13. <https://en.wikipedia.org/wiki/Skewness>
14. https://www.bnr.ro/files/d/Legislatie/EN/E_OUG99_2006.pdf
15. <https://www.bcr.ro/ro/persoane-fizice>