

BANKRUPTCY RISK ANALYSIS FOR A COMPANY IN THE PHARMACEUTICAL INDUSTRY

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Abstract

In a world where businesses in every field of activity face yearly high-risk bankruptcy, the pharmaceutical industry proves to be a thriving and flourishing one. People are increasingly taking care of their health, but on the other hand, the incidence level of diseases of various types is increasing and it significantly contributes to the development of businesses in the field. This paper consists of three parts, the first part which presents the brief evolution of the Romanian pharmaceutical industry, the second part being a theoretical approach of the essential concepts regarding the method of assessing the risk of bankruptcy of a company, while the third part includes the case study. For this, was gathered real data linked with one of the most important players on the Romanian medicines market, in order to determine the level of bankruptcy risk that they face on an annual basis.

Keywords: pharmaceutical industry, risk, bankruptcy, business, market

JEL: G32, I11

1. THE DEVELOPMENT OF THE PHARMACEUTICAL INDUSTRY - AN OVERVIEW

Health has always been one of the most valuable assets of a human being, but over the last few decades, individuals have begun to pay more attention to it. As a result, large amounts of medicines and dietary supplements are consumed year after year, thus pharmaceutical companies reaching a high level of income.

History has shown us how long and often tormenting way had the practitioners in this field, being most of the time persecuted for the gift of offering a reclaim in the affections of the patients of those times.

Regarding the Romanian pharmaceutical industry, we find one of the important milestones in the history of this field in 1857, when Carol Davila contributes decisively to the development of pharmaceutical higher education, by setting the bases of the National School of Medicine and Pharmacy (Stancu, 2008). Troubled period of the early twentieth century affects also the history of this institution, because during First World War the experts weather, including Professor Ștefan Minovici (Stancu, 2008), advocates for the separation between the Faculty of Pharmacy and the Faculty of Medicine, independence which was obtained in 1923.

It was not the only institution of this type in Romania, the number of students increasing. Such centers can be mentioned in the major cities of the country, Cluj - where the foundations of the Upper Dacia University (Pamfil, 1940) were established after 1918, one of its branches being specialized in Pharmacy, or Iasi, where in 1913,

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at the Faculty of Medicine were set up the foundations of a pharmacy department, but initiatives in this area were also in other regions of the country starting with the reign of Alexandru Ioan Cuza. Most of the students in the field (64%) were however trained in the university centers from Bucharest (Pamfil, 1940, in Stancu, 2008).

Although the role of the pharmacy as an independent branch of higher education has strengthened over time and was supported by some of the faculties where the specialties in question were part, year 1934 marked the issuing of a law on the centralization of Romanian pharmaceutical education, one of the consequences being the decrease of the number of places for this specialization.

The need to provide solutions for the population's illness has forced the development of the pharmaceutical industry from a practical point of view, making an extension of production on a larger scale. The interwar period was marked by the expansion of some pharmacies, some of which being formed in partnership with international, French, Austrian names, in addition to the Romanian co-operatives.

Contemporary pharmaceutical history is partly controversial and challenging because it has become one of the most profitable areas over time, growing exponentially, especially over the past two decades. The number of producers, as well as the number of substances and products, is increasing, with two main business models being imposed on the market: specialized companies in activities and specialized companies on the market (Ciulu).

At present, there is a lot of investment in research, even more intensively than in the informatics field, both at European and global level, with tens of billions of euros allocated annually and hundreds of thousands of employees. The concern for new discoveries is growing, as many diseases are still considered incurable.

The bankruptcy risks of companies in this area are rather low, as the whole population of the globe is being confronted with a wide range of diseases, having multiple causes, from genetic diseases to others caused by stress, inadequate nutrition, etc.

According to *economica.net* there are various studies in this domain regarding the overview of the industry, most of them indicating good prospects for the development of these businesses (Milos, Milos, 2014). Thus, a review published by Keysfin on the financial data of Romanian active companies in the field of medicinal drug production and distribution appreciates an upward trend in the results, from 37.92 billion lei in 2012 to 47.87 billion in 2017, the forecast being even higher for the coming years. The results of these companies are largely influenced by marketing practices, the implemented advertising campaigns, as well as by the rise in medicines prices, the turnover and the profit greatly increasing over the years. In this case, the very good results determine the companies to allocate a consistent budget to the promotion activity, often reaching to aggressive campaigns, TV, radio, internet or written press.

According to official surveys and statistics, the total number of drug manufacturers registered in Romania reached 158 in 2016, but this number does not include traders, these being much higher. Among the most important names in the industry are Terapia SA, Antibiotice SA, Sandoz SRL, Labormed Pharma, Gedeon Richter, Fiterman Pharma. In the same field there is a large number of traders with medicines, pharmacies, etc., the most numerous being found in the capital.

According to official information, the pharmaceutical industry is represented by 6 companies listed on the Bucharest Stock Exchange: MedLife, Pharmaceutical Remedia, Zentiva, Antibiotice Iasi, Biofarm, Ropharma. All recorded a positive evolution in 2017, with percentages ranging from 11% to 26%.

"In the" New World "created in the last decade, pharmaceutical companies will focus on coordinating and financing the acquired skills and competences" (Ciulu).

2. THE RISK - THEORETICAL APPROACH

Business, irrespective of the field, involves risks. This is also true with regard to the medicinal drug industry. Thus, risk turns into a natural component, with reference to operational, investment or financing activities. Regardless of the approach, the notion of risk remains a "measure of uncertainty (...), even a future action designed to generate losses that will affect the patrimony, interests, activity and results of an economic agent" (Buglea, 2009).

Literature identifies many forms of risk, which can be mentioned in the following form: speculative risk, pure risk, endogenous risks, exogenous risks, pre-crisis risks, decisional risks, post-crisis risks, enterprise risk, country risk, international risk.

Business risks can be remembered as:

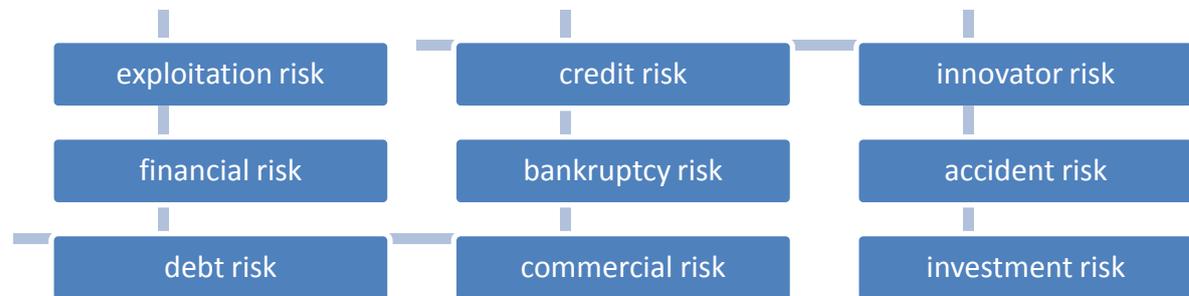


Fig. no. 1. Business risks
(source: Lala Popa et al, 2017)

Several risk categories can be identified at the level of each enterprise, bankruptcy risk analysis being the subject of a more complex analysis.

"Assessing the risk of entering and maintaining a business on a competitive market involves the use of statistical methods, including short-term credit scoring. The purpose of this method is to establish for each firm an indicator called a "score" that allow the estimation of the bankruptcy of the firm.

The score is an "external diagnostic method that consists of measuring and interpreting the risk to which the investor, the lender of the enterprise, and the enterprise as a system in the future work is exposed" (Lala Popa et al., 2017).

Among the most popular models are: Altman Model, Conan-Holder Model, Bank of France Balance Sheet Model (Demyen, Ciurea, 2016). We will continue to focus on the first two, calculating the functions as follows:

Table 1

The Altman Model	
Function	$Z = 1,2X1 + 1,4X2 + 3,3X3 + 0,6X4 + 0,999X5$
	x1 = working capital / total assets = trading capital / total assets x2 = reinvested profit/ total assets x3 = gross result of exercise / total assets x4 = share capital / total debt/liabilities x5 = net turnover / total assets

<i>Levels</i>	level I: solvency firms $Z > 3$ or 2.7 level II: companies with temporary financial difficulties that can be remedied if the strategy is adequate for the situation of $1,8 < Z < 3$ or $2,7$ level III: bankruptcy firms $Z < 1,8$
The Conan-Holder model	
<i>Function</i>	$Z = 16X_1 + 22X_2 - 87X_3 - 10X_4 + 24X_5$
	x1 = working assets - stocks / short-term liabilities x2 = fixed capital / total liabilities x3 = financial expenses / turnover x4 = personal expenses / added value x5 = exploitation result / added value
<i>Levels</i>	level I levels: Solvency firms ($Z > 9$) level II: firms with temporary financial difficulties that can be remedied if the appropriate strategy is applied ($4 < Z < 9$) level III: bankruptcies ($Z < 4$)

(source: Lala Popa et al, 2017)

3. CASE STUDY - ANALYSIS OF BANKRUPTCY RISK FOR A PHARMACEUTICAL SOCIETY, USING THE SCORE METHOD

Generally, in order to be able to apply the Score method, it is necessary to use a wider range of data belonging to either a sample of enterprises or to a longer range of years. It is not possible to draw valid conclusions only by calculating the Z function for a single year of analysis, but it is necessary to make a comparison over several years. Moreover, by statistical testing, indicators that are considered to have a permanent and strong influence on the analyzed samples can be retained.

For the purpose of the present case study, real data regarding Antibiotice Iasi company were used, using public information from the balance sheets of the listed company on the Bucharest Stock Exchange. As a general data, the company is currently in its 63rd year of activity, being a recognized brand in Romania, which maintains business relationships with 75 countries, offering a vast portfolio of 157 medicines.

The bankruptcy risk is present, to a greater or lesser extent, for all companies, but the level at which it can be appreciated is essential. For the present study the scores method was used by determining the Z, Altman and Conan - Holder functions, for which the calculation method was described above.

Information on the time period 2012-2017 was gathered, calculating the $X_1 \dots X_5$ coefficients for each of those years using the formulas in the previous table.

3.1 Calculation of Bankruptcy Risk using the Altman Method

In order to determine the risk of bankruptcy using the Altman method, it is necessary to calculate the Z function with the following formula:

$$Z = 1,2X_1 + 1,4X_2 + 3,3X_3 + 0,6X_4 + 0,999X_5$$

Table 2 Economic data for rate calculation

Year	2012	2013	2014	2015	2016	2017
Working assets	310.675.989	313.535.436	305.661.428	327.313.900	314.785.312	331.443.488
Total asset	514.317.928	511.566.900	503.646.697	544.662.590	533.395.657	572.935.542
Gross profit	32.459.037	34.690.920	37.363.132	32.047.535	34.881.646	35.361.430
Net profit	27.110.836	31.380.855	31.138.739	27.178.823	30.370.811	33.558.354
Own capital	346.548.533	348.651.356	364.331.001	392.649.884	409.066.359	416.877.840
Total debts	160.555.784	155.100.484	134.294.362	144.832.768	117.380.140	151.471.431
Turnover	304.731.950	318.625.015	320.058.303	331.740.206	334.990.734	337.629.448

(Source: Balance Sheet and Profit and Loss Account of the enterprise/firm)

The calculation of the Z-determinant function and the rates for the years 2012-2017 shows the following results regarding the X_i coefficients:

Table 3

Year	2012	2013	2014	2015	2016	2017
X_1	60,4	61,28	60,68	60,09	59,01	57,85
X_2	5,27	6,13	6,18	4,99	5,69	5,85
X_3	6,31	6,78	7,41	5,88	6,53	6,17
X_4	215,84	224,79	271,29	271,10	348,49	275,21
X_5	59,24	62,28	63,54	60,9	62,80	58,92
Z Function	289,425	301,646	332,235	322,058	372,221	322,017

(source : computation made by authors)

3.2 Calculation of Bankruptcy Risk using the Conan-Holder method

In order to determine the bankruptcy risk by the Conan - Holder method, it is necessary to calculate the Z function with the following formula:

$$Z = 16X_1 + 22X_2 - 87X_3 - 10X_4 + 24X_5$$

For calculating the coefficients, the data from the following table will be used:

Table 4 Economic data for rate calculation

	2012	2013	2014	2015	2016	2017
Working assets	310.351.264	313.535.436	305.661.428	327.313.900	314.785.312	331.443.488
Stocks	47.937.857	50.361.680	57.284.464	60.449.619	60.269.602	67.414.789
Short-term debts	155.205.658	133.702.463	114.135.918	122.159.637	95.707.376	130.473.898
Fixed capital	350.366.971	369.853.531	385.989.017	419.308.981	434.773.885	439.636.509
Total liability	514.317.928	511.566.900	503.646.697	544.662.590	533.395.657	572.935.542
Financial expenses	24.368.301	29.436.485	18.441.604	13.487.742	10.810.946	10.015.775
Cifra de afaceri	304.781.950	318.625.015	320.058.303	331.740.206	334.990.734	337.629.448
Staff costs	68.929.460	70.814.377	71.439.222	70.868.388	71.316.549	81.310.923
EBE	252.994.747	281.622.120	297.561.746	278.854.677	298.104.882	335.937.566
Added value	200.805.438	227.197.898	252.886.982	235.830.467	252.588.832	286.623.648

(Source: Balance Sheet and Profit and Loss Account of the enterprise)

In this case, the calculation of the determinant function Z and of the rates for the years 2012-2017 shows us the following results regarding the X_i coefficients, calculated using the Conan Holder method:

Table 5

Year	2012	2013	2014	2015	2016	2017
X_1	1,69	1,96	2,17	2,18	2,65	2,02
X_2	0,68	0,72	0,76	0,76	0,81	0,76
X_3	0,079	0,09	0,05	0,04	0,03	0,02
X_4	0,34	0,31	0,28	0,30	0,28	0,28
X_5	1,25	1,23	1,17	1,18	1,18	1,17
Z Function	61,72	65,79	72,37	73,44	83,13	72,58

(source : computation made by authors)

3.3 Conclusions of the case study

Evolution of Z score, from 2012-2017, calculated using the Altman method, is shown in the following graph:

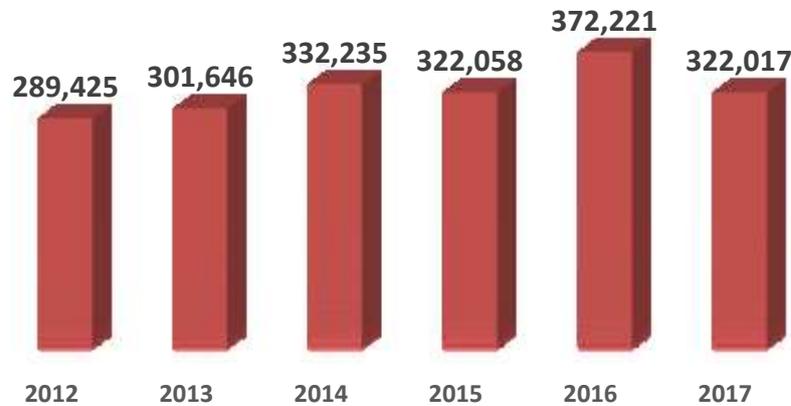


Fig. no. 2 – Evolution of the Z score
(source : computation made by authors)

The limits set in this case for determining the solvency of the enterprise are:

- o $Z < 1,81 \Rightarrow$ the enterprise is insolvent
- o $1,81 < Z \leq 2,90 \Rightarrow$ the enterprise finds itself in difficulty
- o $Z > 2,90 \Rightarrow$ the enterprise can be considered economically sound.

The results obtained from the calculations, as can be seen in the above graph, may be associated with the third situation, exceeding the level set as being minimal for the enterprise to be considered economically sound.

Evolution of Z score during the analyzed period 2012-2017, calculated using the Conan-Holder method, can be represented by the following graph:



Fig. no. 3 – Evolution of the Z score
(source : computation made by authors)

Based on the calculations, it can be seen that the company's situation, according to the Z score calculated using the Conan-Holder method, is very good.

The limits set in this case are:

- $Z \leq -5 \Rightarrow$ catastrophic situation
- $-5 < Z \leq 4 \Rightarrow$ unfavorable situation

$4 < Z \leq 9 \Rightarrow$ uncertain situation

$9 < Z \leq 16 \Rightarrow$ favorable situation

$Z > 16 \Rightarrow$ very good situation.

All calculations indicate a good company situation, taking into account these results, the likelihood of bankruptcy being below 15%.

All things considered, after using both methods for calculations made (the Altman method and the Conan-Holder method), it can be forecast that Antibiotice SA has a very good financial situation, thus being unlikely that it will face a high bankruptcy risk during the next period.

However, some recommendations can be made, and the society should also pay attention to the following aspects:

- possible managerial errors;
- level of communication with employees;
- staff motivation strategy;
- the qualification level of the personnel;
- the possibility of new competitors entering on the market;
- the characteristics of the life cycle stage in which it is positioned.

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