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DIAGNOSIS OF BANKRUPTCY RISK IN THE FURNITURE INDUSTRY USING THE CANON-HOLDER AND ALTMAN MODELS

Case
Study

Keywords

The Alman Pattern,
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JEL Classification

M41

Abstract

The financial and economic crisis that started in 2008 caused negative effects felt by the entire European economy, affecting more or less all of the world's economies. This paper aims to study the diagnosis of bankruptcy risk using the Canon-Holder and Altman methods, from a theoretical point of view and with practical examples on a company in the furniture industry in Romania. In a context of economic uncertainty, the relevance of such an analysis designed to quantify the risk of bankruptcy for companies is the default. The financial data used is real and descriptively analyzed, we analyzed a period of eight years, between 2006-2013. As a method of analysis complementary to the financial analysis of the background of companies, the diagnosis of bankruptcy risk using the score method, using the specific models known in the specialty literature, brings relevant information concerning the problem of risk assessment. We concluded in the case study the opportunity of such an analysis for the furniture industry through the results obtained in the case studies, the method is a useful tool, especially for the practitioners in the sector.

1. Introduction

The furniture industry in Romania appears in the national context as one of the most profitable industries of the Romanian economy. Essentially, although there are important challenges for the sector, it can be said that investments in the furniture industry are mostly profitable, and this is due to the outstanding quality of Romanian furniture, exported mostly in Central and Eastern Europe.

This paper aims to study the diagnosis of bankruptcy risk using the Canon-Holder and Altman methods, from a theoretical point of view and with practical examples on a company in the furniture industry in Romania. The challenges in the sector of the furniture industry in Romania are many, in the context of large and medium companies in the industry have been significantly affected by two factors: the global economic crisis, debuting with powerful effects in 2009, and the military crisis in Eastern Europe, due to the conflict in Ukraine, debuting in February 2014. These two external factors to the industry are a particular challenge in the sense that both have determined and will determine serious changes in the sector, as much as for production, as for commercialization.

Developing companies in the furniture industry, as in the case of the national industry, currently require an extremely rigorous management, especially in financial terms. For the furniture industry in Romania the concern is important given that the industry is an opportunity for our country, both economically and ecologically, the furniture industry, having the highest value completely adds to the whole economical sector.

The economical and social context of the period after 2008 and until today can be characterized as having a positive development, from a financial uncertainty in the huge global economic crisis, to the sector's significant growth signals in recent years. The appreciation enjoyed by the furniture industry in Romania in the woodworking sector has been increasing in the last year. An element that brings great difficulties to the furniture manufacturers, according to the president of the Furniture Manufacturers Association of Romania, Mrs. Aurica Sereny, is the cost of raw material, i.e. wood, which increased in 2014 by 25% - 30%. Thus, due to this phenomenon, many furniture manufacturers, in particular those that work with softwood, are, towards the end of 2014, near bankruptcy. It is important to note that the furniture industry in Romania, in the first months of 2014, increased in the percentage of the total wood industry, from 46% in 2013 to 49.3% in the first half of 2014 (Zilahi Imre, 2014, pp. 10-12).

In this favorable context for the furniture industry sector in the last 2-3 years, we think it is appropriate for any initiative to improve the financial management for entities in the sector to be

made, through measures applicable not only for large companies in the sector but also for micro, small and medium enterprises.

2. Literature review

The function of forecast, according to the author V. Nicholas, plays an important role in the management process, because it requires carrying out works that anticipate the evolution of a system, the ultimate goal being the development and expression of a forecast. Through this effort, we envisage, predetermine "with methods and specific means to the goal, the dynamics and efficiency of an action or system of actions" (Valentin Nicolae et. al., 2003). However, based on the Altman or Conan-Holder models, computer models that were built by processing financial data directly provide an estimate of the probability of bankruptcy of the entity. One such example was made in the literature by I. R. scolean, R. Dobra and GC Slusariuc (2012). The diagnosis of bankruptcy risk was and is extensively studied in specialized literature, both in the country and in foreign literature. There were several attempts at establishing econometric models for risk quantifying. The overall purpose of these researches was to obtain an estimation of a possible bankruptcy before it occurs to facilitate management decisions designed to prevent this.

Through statistical modeling of indicators, most of the times financial, for the most common models, according to the results tested by the creators of the Altman model, Conan-Holder model, Cematt model or others, it is possible to forecast bankruptcy before a period such as this one occurs. The usefulness of this analysis, in our opinion, is especially striking in the dynamic context of contemporary economy, in which the threat of a new economic crisis is made because of the difficult political context.

The Altman model, developed by Professor Altman, for the purpose of specialized literature can provide information on the possible bankruptcy of companies by about two years before it occurs. This model is presented in Romanian specialized literature, pointing out several authors such as Monica Violeta Achim (2009, pp. 410-411) and Silvia Petrescu (2010, pp. 261-262) G. Holt (2009), etc. The "Z" bankruptcy prediction model appeared in the United States in 1968, and was later developed in 1977 by Professor Altman, who is considered a pioneer of statistical models for forecasting of bankruptcy. With this model, Professor Altman was able to forecast approximately 75% of the bankruptcies of some companies, about two years before they occurred.

In 2008, Panayotis Alexakis studied the actuality of the Altman model on companies in the stock exchange in Greece. The research results support the hypothesis that, from the examples of the companies in Greece, we can say the that the

Altman model has the ability to predict bankruptcy of companies with certain changes by 5, or even 8 years (Panayotis Alexakis, 2008).

In 1970 the Canon-Holder model, named after its creators, also makes its appearance. The model was developed by Joel Conan and Michel Holder in France, using the discriminated analysis. According to their research, there is the possibility of determining the probability of bankruptcy. They developed a model based on 31 installments between 1970-1975 on 190 small and medium enterprises, of which 50% went bankrupt. In addition to the advantages of discriminated analysis, there is the disadvantage that the information base model is reduced to a few installments, not having considered a broader range of financial ratios, the company is thus seen as a complex system (L. Mândru, A. Khashman, C. Carstea, N. David, L. Patrascu, 2010).

Another parallel that can be made related to bankruptcy forecasting scoring models is the link between the Going Principle, and the bankruptcy forecasting scoring models. The Going Principle says that "*entity continues to operate normally, without going into liquidation or significant reduction in activity*" (OMPF 3055/2009, art. 36, par. 2). It can be said that scoring models, such as those analyzed by us - Altman and Conan-Holder can provide useful and timely information to support opinions on the going concern premise of activities excluding bankruptcy, in stable economic conditions (Tatiana D nescu, M rginean Radu, 2013).

Professor Altman E., says it is evident that the size of a company cannot guarantee its continuity of activities (Edward Altman, Edith Hotchkiss, 2006, p. 3). The acute problems for the world economy have emerged with the bankruptcy of giant US companies. This raises the concern in the US economic governance in around 2002, there is a need to adapt the audit to the problem of not respecting this principle by introducing new rules and methods. Resounding bankruptcies of major US corporations, such as Enron, through the audit competition of the firm Arthur Andersen, led to a change of position of the US legislature regarding the activity of auditing of the financial situations, through the adoption in 2002 of the Sarbanes Oxley Act. This act provided a much more rigorous regulation of audit, under the conditions of a generalized fear at the time of the possibilities of fraud within the audit Geiger M., K. Raghunandan (2002).

Specialized literature has shown there is a direct link between the furniture industry and the construction industry, furniture is the next of people's worries after buying a house. For the authors So-yeon Yoon, Ph.D. & Ji Young Cho, the furniture industry, in essence, is an area of interest for buyers because it is a chance for personal

individualization, the second point of interest immediately after purchasing a house (So-Yeon Yoon, Ji Young Cho, 2009). Also, the same authors stated that the purchase of furniture is much more important for women than for men, and the main option in furniture purchasing is the style and color, more than the price or quality.

In the context of what was presented, we consider that our analysis is appropriate and useful for entities operating in the furniture industry in Romania, by providing a framework accessible to financial analysis to quantify the risk of bankruptcy using the scoring methods.

3. Research methodology

In order to achieve the objectives of this paper, namely the study of bankruptcy risk in the furniture industry through the Canon-Holder and Altman models, works from specialized literature on economic and financial literature, both from Romanian and international literature, were consulted.

For this study, we used a descriptive analysis performed on database consisting of real financial data, consisting of financial indicators extracted from an eight-year period (2006-2013), from the financial statements of SC Mobex SA, a large company in Romania, with activities in the furniture industry. We also used the analysis of series of derived indicators and several methods of quantitative analysis of data were used, such as, comparison, grouping and deduction.

The data was arranged in tables and the indicators that make up the two models of diagnosis of bankruptcy, Conan-Holder model and Altman model, were calculated.

According to Professor S. Petrescu (2010, p. 262) and M.V. Achim (2009, p. 411), from a methodological point of view, the *Altman model is a scoring function, which involves the calculation of five indicators, as follows:*

$$Z=1,2*X1+1,4*X2+3,3*X3+0,6*X4+0,999*X5$$

➤ *Flexibility of the company* (X_1) is determined as the ratio of current assets (AC) and the total assets of the company (AT): $X_1=AC/AT$;

➤ *The rate of self-financing assets* (X_2) is determined as the ratio of reinvested profits (PR) and the total assets of the company (AT), $X_2=PR/AT$;

➤ *Return on assets* or economic profitability (X_3) is determined as the ratio of operating income (RE) and the total assets of the company (AT), $X_3=RE/AT$;

➤ *Indebtedness capacity* (X_4) is determined as the ratio of share capital (CS) and total debt (TD), $X_4=CS/TD$;

➤ *Return on assets or asset turnover rate* (X_5) is

determined as the ratio of turnover (CA) and total assets (AT), $X_5 = CA/AT$;

The Altman model, ranks companies according to the result of the Z function, as follows (S. Petrescu, p. 262):

- If $Z > 2,675$, then the company is solvent.
- If $1.81 < Z < 2,675$, then the company has financial difficulties but can reduce its activity to the extent that an efficient management of the company will follow.
- If $Z < 1,8$, then the company's bankruptcy is imminent.

The same author S. Petrescu(2010, p.263) talks about the existence of certain limits when approaching the author's model, Professor Altman making some changes in the model to meet the American economy sectors: private companies in the industrial sectors, non-industrial private companies, etc.

The initial model was built between 1946-1965 and focused on the US manufacturing sector. Prof. G. Hol reminds the Z function determined by the Altman model for US private companies in the industrial sector, which is(Gheorghe Holț, 2003):

$$Z_2 = 0,717 * R1 + 0,847 * R2 + 3,107 * R3 + 0,42 * R4 + 0,99 * R5$$

In this case, a score above 2.9 indicates the absence of risk, The gray area between 1.23 and 2.90 and below 1.23 it means that is a sign of an important imminent bankruptcy risk with a probability of occurrence of 95% in the first year and 70% thereafter(L. Mândru, A. Khashman, C. Carstea, N. David, L. Patrascu, 2010).

On the basis of both alternatives of the function Z defined by Professor Altman, we proceeded to calculate both variants of functions for a true and fair view of the financial position of the company.

Conan-Holder model was developed by the two authors and was managed to forecast over 50% of bankruptcies of firms in the 70s. This model is calculated based on all five financial indicators, using the following formula (Achim Monica, 2009, p. 412):

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

- *Quick Ratio* (X_1) is determined as the ratio of current assets (ACR) subtracted by the stocks (S) and current debts of the entity (DCR). $X_1 = (ACR - S)/DCR$;
- *Financial stability rate* (X_2) represents the permanent capital share (CPM) in total liabilities (PB), $X_2 = CPM/PB$;
- *The sales financing from external sources* (X_3) is determined as the ratio of financial expenses (CF) and the net turnover of the entity (CAN), $X_3 = CF/CAN$;

➤ *The level of of staff remuneration* (X_4) is determined as the ratio of personnel expenses (CP) and the value added (VA), $X_4 = CP/VA$;

➤ *The rate of return of the value added* (X_5) is the degree to which the gross result of exploitation (RBEXP) produces added value (VA) and is determined by the relationship, $X_5 = RBEXP/VA$;

The grouping firms depending on the Z score using the Conan-Holder model is as follows:

- If $Z > 9$, then the company is solvent.
- If Z is in between (4.9), then the company is in an area of incertitude with possibilities of recovery.
- If $Z < 4$, then the company's bankruptcy is imminent.

Depending on the score of a company an interpretation can be made. We can see that bankruptcy probability decreases with increasing score, as shown in Table 1.

4. Case study

To achieve the case study, the financial statements were taken from S.C. Mobec S.A., a company with activities in the furniture industry. Financial indicators were extracted from the company's balance sheet and profit and loss account of over a period of eight years from 2006 to 2013.

4.1. Bankruptcy diagnosis by Altman model SC Mobex S.A

In specialized literature, for the Altman model there are several score functions presented. For this case study we selected the best known model version, the original version of the Altman model, expressed by function calculated "Z function" in Table 2. Built as a feature of the Altman model, The Z function for industry was also calculated because the company has its activity in the industrial production of furniture, a large company with about 700 employees.

The dynamic of the function of Z of the Altman model for industrial enterprises, calculated on the chosen company is presented in Figure 1 and the **dynamic of the Z function for the industry using the Altman model is presented in Figure 2.**

From Figures 1 and 2, we can conclude that the dynamic of the function of Z, for both the Z-score calculation methods, the entity is relatively well positioned, although for the last years of analysis, it is in a downward trend.

In the first three years of analysis the company is in an evident growing trend. This element is explained by the fact that the furniture industry in Romania is very closely related to the construction industry, and that 2006-2008 was a particularly good period for the construction industry.

Under the influence of the economic crisis of 2009, the Z-score trend decreases, while the majority of outcome indicators are declining for society during this period. The effects of the economic crisis on society are very serious and result indicators strongly affected society in 2009.

In 2009-2011 the Z-score model shows a slight increase, following the trend of decline to be resumed in 2012 and 2013. Although there is a correlation between the results of the Z-score and the net result or results of operations for the years 2013-2013, it is important for the company to monitor the development of the Z-score model in the limits established by the Altman model, now hovering in the model's gray area.

4.2 Bankruptcy risk management using the Conan-Holder model.

For the company S.C. Mobex S.A., using the company's Balance Sheet and the Profit and Loss, the Canon-Holder model has the form presented in Table 3.

Represented in dynamics, from Figure 3, we can see the situation of the company using the Conan-Holder model. The company's recorded score is good, considering the economy of the recent years.

We can observe the favorable positioning of the company in the period under review, the company having only had a 10% - 25% risk in 2006-2007. Since 2008, although the score's evolution was fluctuating, bankruptcy risk remains below 10%. The specificity of the Conan-Holder model is the ability to quantify this risk using several grids. Thus we see that although for the last three years the trend indicator increases, the company maintains itself at a 10% risk of bankruptcy. The ability to quantify risk in a better way than the Altman model is an advantage of the Canon-Holder score and enables a more detailed interpretation.

As is found in Figure 3 there is a need to observe, as in the case of the Altman model, referring to the score in a decreasing trend over the past three years. Careful monitoring is required for controlling the risk level to a value of comfort of below 10% and it is recommended to identify ways of maintaining a stable trend of the Z score

5. Conclusions

As a main research objective, in this paper we have presented ways of diagnosing the risk of bankruptcy using the Canon-Holder and Altman methods, from theoretical and practical examples, on a large company in the furniture industry in Romania.

In specialized literature, using literature review, we were able to see that there are several approaches of diagnostic models of bankruptcy risk. We could see the advantages of using scoring models for quantifying the risk of bankruptcy, but we also found limitations in the methods, such as a lack of

an overall picture of the companies analyzed using the scoring method, due to the use of only a certain rate.

Regarding the practical approach to the work, the analysis reflects the dynamic evolution of the score obtained by applying the models Altman and Canon-Holder, and the Z function calculated based on financial ratios extracted from an 8 years period. We were able to see and observe several aspects regarding the evolution of the company in the period under review, with the economic crisis' effect on the company, visible both in the scoring models and in the results indicators. In light of the Altman model, we concluded there is a need of careful monitoring of the company in terms of a decreasing trend of the Z score in the uncertainty of the current economy. From the analysis made, we can conclude that the economic company examined currently has a positive position, but monitoring and identifying ways to increase the Z score of the Altman model is required.

By using the Conan-Holder model for determining the risk of bankruptcy, during the largest part of the period analyzed the entity has a favorable position, only having a 10% risk in 2006-2007. Otherwise, the score obtained during the analyzed period the company is positioned at a very low risk of below 10%. The advantage of the Conan-Holder model, unlike the Altman model, can be expressed by the existence of a more detailed expression of results, risk quantification being much more detailed than in the Altman model. For the purposes of what was presented, we conclude that companies in the furniture industry, and not only, can opt to analyze their company using the Altman and Conan-Holder models to obtain important information regarding the diagnosis of bankruptcy risk. This paper presented makes a significant contribution to the analysis and diagnosis of an important sector of the national economy, and the results of the research can be useful for the Romanian management in the furniture, business, and academic sector interested in specialized information.

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Table 1. Interpretation of the scores using the Conan Holder model

Score value	Bankruptcy probability
Z<0	>80 %
0<Z<1,5	75-80 %
1,5<Z<4	70-75 %
4<Z<8,5	50-70 %
Z=9,5	35 %
Z=10	30 %
Z=13	25 %
Z=16	15 %
Z>16	<10%

Source: Achim M.V., Analiz economico-financiar , 2009, p. 412.

Table 2. Calculation of the function of Z using the Altman model

Indicator	2006	2007	2008	2009	2010	2011	2012	2013
Current Assets (CA)	18886258	20204618	22380104	19962328	21778780	19778831	21954217	24011621
Total Assets(AT)	26930116	29285850	31645528	29189520	30180460	33984184	44652762	47595229
Reinvested Profit(PR)	859295	860878	2330278	437828	1127816	614495	1385205	1907635
Exploitation results (RE)	2982350	4505081	6171131	2857091	3127282	3554087	4652231	4485701
Total Debts(TD)	13323363	14526342	14648178	11954612	12961424	10206531	13343530	14248634
Paid Dividends(Div)	1009000	1407135	1416174	1313486	1127816	1843485	1970000	1144580
Net Result of exploitation (RN)	1868295	2268013	3746452	1751314	2255632	2457980	3355205	3052215
Equity(CS)	4238358	4238358	4238358	4238358	4238358	4238358	4238358	4238358
Turnover(CA)	39183920	44123401	52251819	34989206	36744910	42838133	45821798	46520462
X1=AC/AT	0.70	0.69	0.71	0.68	0.72	0.58	0.49	0.50
X2=PR/AT	0.03	0.03	0.07	0.01	0.04	0.02	0.03	0.04
X3=RE/AT	0.11	0.15	0.20	0.10	0.10	0.10	0.10	0.09
X4=CS/TD	0.32	0.29	0.29	0.35	0.33	0.42	0.32	0.30
X5=CA/AT	1.46	1.51	1.65	1.20	1.22	1.26	1.03	0.98
Z Function	2.90	3.06	3.42	2.57	2.67	2.58	2.19	2.13
Z Function for industry	2.46	2.62	2.94	2.15	2.22	2.19	1.86	1.79

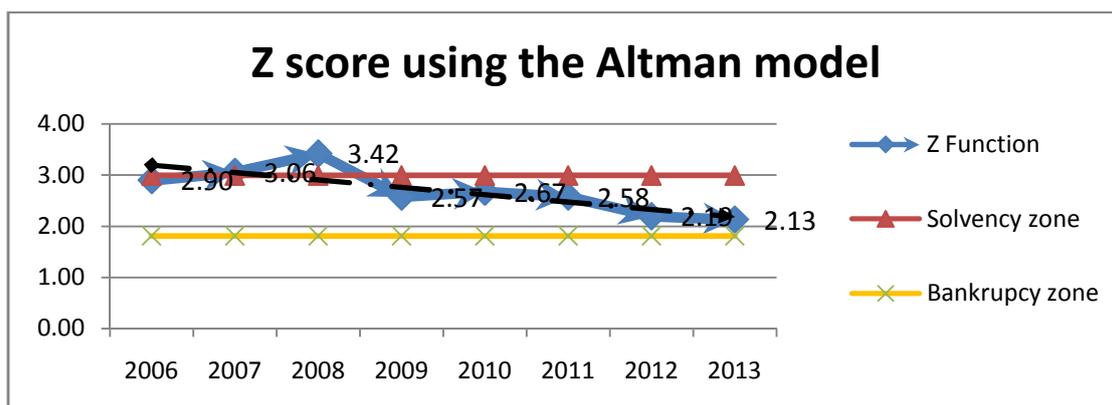
Source: personal project based on the entity's financial statements.

Table 3. Application of the Canon-Holder model for S.C. Mobex S.A.

Indicator	2006	2007	2008	2009	2010	2011	2012	2013
Current assets (AC)	18886258	20204618	22380104	19962328	21778780	19778831	21954217	24011621
Stocks(ST)	11827166	13431291	14841498	13692969	14136337	14148196	16887793	18539870
Current deobt(DC)	10606336	11646666	11990050	8646464	10721309	9026363	9228471	9881729
permanent capital (CPM)	15538605	16960198	19077968	20063128	19052133	29962593	34409205	35743265

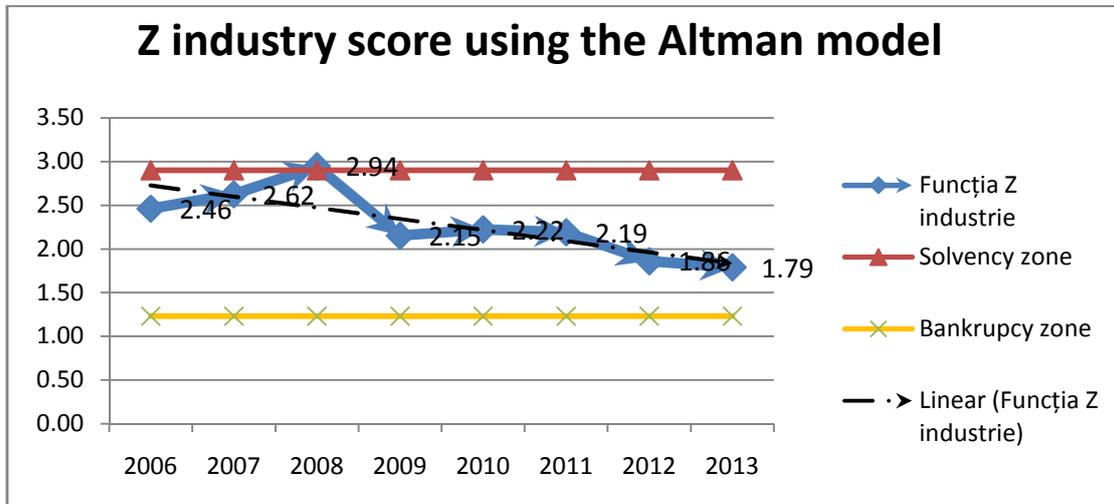
Total liabilities (TP)	26930116	29285850	31645528	29197114	30180460	39496758	44652762	47595229
financial expenses (CF)	1562894	2158562	2064376	1118566	1302703	1215858	1379600	1578171
Net Turnover(Ca)	39183920	44123401	52251819	34989206	36744910	42838133	45821798	46520462
Staff Costs (ChP)	17931057	20608426	23436053	16794314	17570005	19520967	22009620	22493334
Added value(VA)	21782739	26783820	31730518	21205314	22211902	25363675	28702380	29757268
Operating result(REX)	2982350	4505081	6171131	2857091	3127282	3554087	4652231	4485701
$X1=AC-St/DC$	0.67	0.58	0.63	0.73	0.71	0.62	0.55	0.55
$X2=CPM/TP$	0.58	0.58	0.60	0.69	0.63	0.76	0.77	0.75
$X3=ChF/CA$	0.04	0.05	0.04	0.03	0.04	0.03	0.03	0.03
$X4=ChP/VA$	0.82	0.77	0.74	0.79	0.79	0.77	0.77	0.76
$XI=REX/VA$	0.14	0.17	0.19	0.13	0.14	0.14	0.16	0.15
Z-Score	14.93	14.13	17.17	19.25	17.68	19.87	19.34	18.49

Source: personal project based on the entity's financial statements.



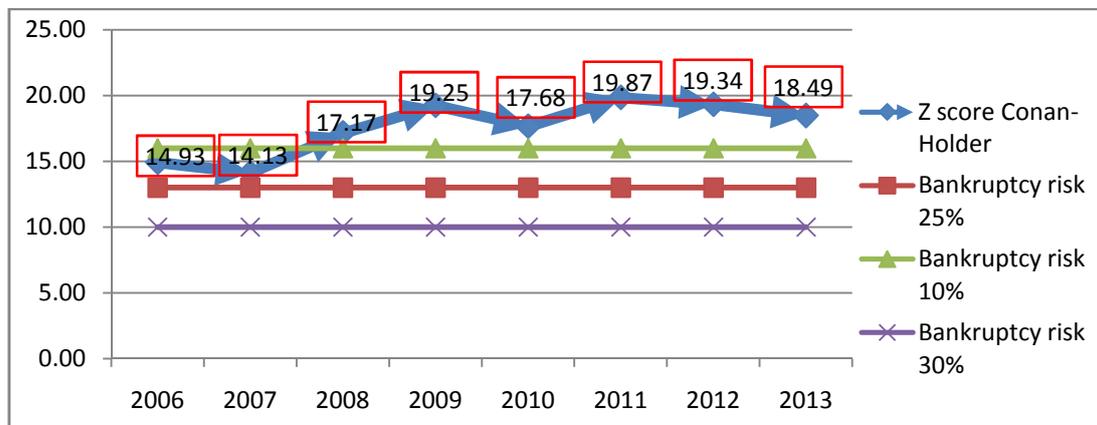
Source: Author's projection.

Figure 1. The function of Z using the Altman model



Source: Author's projection.

Figure 2. The dynamic of the Z function for the industry using the Altman model.



Source: Author's projection.

Figure 3. Z-score Canon-Holder model