DETERMINING AND IDENTIFYING FINANCIAL RISKS FOR COMPANIES

Katarzyna Strojny*

Abstract

Bankruptcy is a process registered in the operation of the free market economy. The basis for this phenomenon is very complex and it possesses economic, legal, and even social repercussions. With the recent financial crisis and the problems of many businesses in our country, it is certainty unfortunately that the issue of bankruptcy is still current and present in the present reality. With regard to the consequences of this phenomenon being of not only an economic nature but above all of a social one, it's worth looking to a rapid assessment of a company's financial problems, which a financial unit by unit analysis would give. This paper aims at showing the economic issues related to the financial risk of a company as well as attempting to form models for forecasting bankruptcy in individual cases in current Polish conditions.

Keywords: *bankruptcy, company's financial risk, early-warning models*

1. Introduction

The tumultuous changes, which we are witnessing, indicate that the threat of bankruptcy and financial issues of unit are still current. In our country, topics related to financial problems and bankruptcy appeared only with the social-economic changes and the advent of the market economy. The Course literature stresses that bankruptcy is a natural process of cleaning the market out of economically inefficient enterprises which disappear from economic life as they are not able to meet the demands of competition. It seems that the problems relating to financial risk and bankruptcy make it difficult to keep to these issues indifferent. The bankruptcy of a trader causes many adverse consequences not only to a bankrupt, but also to those who are associated with him. Suppliers of goods and services may be uncertain as to the payment of the money owed to them, lenders are exposed to loss their claims. Customers of a potential bankrupt may be in threat of lack of regular supplies of goods, services and materials used in a production process. This in turn, may result in problems with the implementation of agreements with their contractors. The presented situation makes the assessment of a financial standing of

* Ph.D. Student Katarzyna Strojny, Cracow Uniwersity of Economics, Cracow, email address: strojny@poczta.onet.pl

a company and the assessment of a risk of its bankruptcy, an important part of risk assessment activities and economic life in the present reality.

The article is intended to show economic aspects related to bankruptcy of an enterprise, a statistical presentation of the recognition of this phenomenon and a presentation of examples of early warning models against bankruptcy used in Polish conditions.

2. Financial threat of a unit – economic dimension

Economic considerations relating to bankruptcy are associated with the life cycle of a unit (Sokół, 2011, pp. 213-234). The classic life cycle of an enterprise consists of three main stages: the growth, the maturity and the decline. In the growth phase, a company enters the market, and therefore there is a great need for capital in the form of cash. A company expands its distribution channels, tries to achieve profitability and thus has problems with financial liquidity. After reaching relative financial stability and with a stable situation in the market, investment needs begin to appear. However, in connection with low financial liquidity, they are unlikely to be satisfied. After entering the market and gaining clients a company advances into the maturity phase where it has a fixed income and profits, and acceptable financial liquidity. The maturity phase lasts until a decline in revenues and first financial problems with profitability and liquidity appear. A company then passes into the decline phase. Although a deterioration of the financial situation in each company has an individual character, there are 4 characteristic elements of the decline of a company, namely: the crisis, the threat of bankruptcy, insolvency and ineligibility for bankruptcy (Holda, 2006, pp 53-86). At the time of the crisis, the Board may take measures leading to a restructuring of a company. However, sometimes crisis signals are underestimated. In a situation when there is no a response to the emerging crisis, problems in a company will deepen driving it into the second part of the end-stage phase. At this point, there are real threats that may lead to the collapse of a company. The next stage is mainly caused by the lack of reaction to bankruptcy problems in the I and II end-stage phases. The last stage is the loss of eligibility for bankruptcy. This simply means that a company lacks the ability to carry out insolvency proceedings, because the associated costs are too high in relation to the assets a company possesses. Bankruptcy for some is the end of a company, while for others it is a second chance. In fact, there is still some room for acting. We can continue running a company, carrying out activities related to its restructuring, conclude an arrangement with creditors or liquidate a company without taking any actions.

Financial risk-related problems do not appear suddenly. There are often indicators to be seen well in advance. Noticing and not ignoring this threat is important for many reasons, but first and foremost it is relevant for owners and the management of the company. Concerns about a company's economic situation should arise if even only to be able to cover costs caused by the unfavorable situation. Typical costs associated with the deterioration of the economic situation of a company have been presented in table 1.

Table 1. The concept of costs associated with the bankruptcy of a firm

Criterion of cost sharing	**The level of analysis: micro-economic**
	The costs of bankruptcy
1	2
1. Time horizon	
a) generated before the bankruptcy (financial difficulties)	**Direct:** -additional administrative and legal expenses, -additional costs in connection with delays in paying financial commitments, -the cost of the valuation of the property as security, -the costs of changing and renegotiation of contracts. **Indirect:** - managers of a company threatened with bankruptcy can take measures to allow them to survive short time, however, they are adverse effects from the point of view of a company's value, -both customers and suppliers at the time of obtaining the information about a bad financial situation of a company may take action to limit their risks, -the Agency's costs associated with the conflict between shareholders and creditors: the costs of lost effectiveness and costs of supervision by creditors, -the costs of contracts arising from changes of investment risks -loss of sales and profits, -lowering the standards of working conditions of employees,
(b) generated during insolvency proceedings	-disputes between creditors may impede the sale of assets, which decreases its value; -preparatory costs (legal proceedings) -the costs of the insolvency proceedings (salary for the trustee and his staff, the costs of notices and announcements, the costs associated with the liquidation of assets; the cost of valuation and auction of property, the cost of activities costs under public law)
(c) arising after the liquidation of assets or the conclusion of an arrangement with creditors	-borne by creditors as a result of the postponement of the deadline for payment of claims or redemption of debt

2. Type of conduct	
(a) bankruptcy liquidation	The costs of the remuneration for trustee and persons acting on his behalf, the cost of notices and announcements, the costs associated with the liquidation of assets (costs of salary for employees, including severance pay, the costs of valuation and liquidation of assets, the other public legal costs)
(b) reorganisation proceedings	-the costs following the creditors
3. The approach from an accounting point of view	
(a) accounting	It should be noted that in the accounting records there are no solutions for the costs of bankruptcy. Despite the fact that the introduction of an additional set of accounts, for example the costs of the bankruptcy, would be within the limits of the laws in force at the balance sheet, in practice it often simply duplicates a standard chart of accounts adjusting it only to enterprise needs.

Source: Boratyńska K. (2009).

As previously mentioned symptoms of deteriorating financial situation of the entity are *visible* in advance. Literature on this subject stands out for its macro-economic factors (external), which can be divided into three categories depending on their scale (Pałczyńska-Gościniak, 2001, pp. 14-24).

- the causes associated with the situation of the sector of the economy or industries in which work units such as: intense competition in the industry, strong competition from importers at the sales market the products of the company concerned, difficulties in complying with the growing demands of the market, the strong concentration of the capital of competing companies,
- the causes resulting from the overall situation of the wide surroundings of the entity: change in the economic or political system of the state, recession, inflation, changes in interest rates, exchange rates, fuel prices, random events, the need for implementation of new methods of operation and deep restructuring in connection with Poland opening up to foreign investment, frequent and unexpected changes in business law and tax legislation,
- the causes resulting from the global situation: unfavorable trade policy of developed countries, political and economic developments in other countries.

The other causes result from the internal situation of the unit, and they are such phenomena as:

- implementation of too large investment projects,
- financial decisions leading to too much debt,
- operational activities over financial opportunities,
- inadequate financial control of concluded contracts,
- adverse changes in the contractual agreements,

- difficulties in supervising geographically widespread transactions,
- failure or ineffectiveness of measures to eliminate loss-making projects,
- internal conflicts and lack of ability to solve them.

Among the internal reasons which may affect a company and cause threat to continuing its activity, one can also mention: no improvement of own products; creation of apparent news, persistence of outdated products on the market in relation to modern trends, inefficient distribution, disregarding of the importance of presales and post-sales services, inadequate techniques for maintaining and improving the quality of goods and services, inconsistencies in creating and perpetuating the image of a company, and lack of market research. Another issue is incorrect and unreliable data derived from accounting and financial departments in a company. The problem may also prove to be a fraud and manipulation of accounting financial data company(Hołda & Nowak, 2001).

In the light of the seriousness of the symptoms of the deteriorating situation of an enterprise, it is worth mentioning empirical data on this issue. Administrative studies carried out on the causes of bankruptcy (Szczerba, 2007, pp. 37-58) show that one of the most important reasons is the size of the company-expressed in the number of employed workers. An increase in the number of employees means that there will be a growing amount of commitments in respect to salaries, contributions to Social Security, or public-legal obligations. In the opinion of respondents, location was of vital importance for companies and services. Important factors were also weakness in management, negative financial results, high debt, overdue obligations, erroneous strategy, the lack of adequate financial controls, poor financial management, a high leverage financial ratio, the demand for credits and loans, and creative accounting. The structure of causes of bankruptcy according to indications by trustees and judicial supervisors is as follows: internal factors in operational sphere – 22%, internal factors in the financial sphere – 20%, 13% of the indications refer to internal organization of a company, capital causes – 13%, reasons arising from economic policy – 10% , market and social causes – 9%, improperly carried out privatization – 9%, while in the opinion of the 5% of respondents incorrectly carried out mergers/acquisitions are also among the causes of the failures.

3. Bankruptcy in Poland in terms of statistical data

This part of the work presents the statistical coverage of bankruptcy issues in our country. How the following figures show, the problem of bankruptcy in Poland is not an issue that can be ignored. In this part of the work describes the statistical coverage of the bankruptcy issues in our country. How bankruptcy

figures in Poland is not an issue that can be ignored. Bankruptcies in the Polish courts in year 1990 -2009 are presented in Tab. 2

Table 2. Bankruptcies in the Polish courts in the years 1990-2009

Year	Complex applications	Taken Care Of			Remaining for future consideration
		Total	Acknowl-edged in whole or in part	Rejected	
1990	149	59	28	25	112
1991	1250	656	297	166	706
1992	3661	2155	812	641	2227
1993	5429	4324	864	1400	3226
1994	4193	4056	788	1141	3387
1995	2992	3246	721	1013	3213
1996	2710	3214	796	869	2776
1997	2368	2531	679	680	2840
1998	2667	2793	724	655	2729
1999	3149	2986	710	766	2933
2000	4442	3908	876	882	3467
2001	6421	5499	905	1200	4387
2002	6814	5456	1141	1388	4749
2003 to 30.09	5736	6928	-	-	3538
2003 from 01.10	4105	2478	-	-	1627
2004	10794	9012	-	-	3213
2005	11173	11966	-	-	3,127
2006	9755	11156	-	-	4342
2007	7135	7670	-	-	3671
2008	6854	7465	-	-	3041
2009	8638	8179	-	-	3501

*bankruptcy and reorganization including source: Dec P. (2011).

Bankruptcy statistics for the years 1990-2009 show that this issue arose in Poland immediately after the introduction of the market economy. According to the data presented there was a rapid increase in bankruptcy in the years 1991-1993. A decline in the number of bankruptcies took place in our country in the period of 1994 to 1997. During the years following between 1998 and 2003 there was a second wave of the growth. The years 2004-2009 involve data relating to insolvency and recovery proceedings together (in accordance

with the new law). Hence, it is difficult to refer only to earlier years, because these figures are not comparable. The year 2009 shows another increase in proceedings carried out and corrective action in relation to previous years. An analysis carried out in the various districts shows that the distribution of bankruptcies is uneven and depends on the level of development of the region. Bankruptcy figures according to industry is presented in Table 3.

Table 3. Bankruptcy figures according to industries

Branch	2007	2008	2009	2010	2011
Production	173	168	277	250	211
Building & Construction	49	59	82	98	107
Wholesale	89	63	138	107	115
Retail	18	20	30	25	46
Transport and storage	22	15	52	40	143
Activities linked to the real estate market	9	6	14	12	28
Other	87	71	80	108	114

source: own elaboration based on www.coface.pl.

Analysis of bankruptcies indicates that in the presented years most cases of insolvency took place in the production sector, while trading took second place among industries. The construction branch is another industry that for years has been at the forefront with the highest number of failing companies. In turn, when considering bankruptcy from the legal point of view, most bankrupts happen among the companies with limited liability.

4. Early-warning Models used in Polish conditions

Issues related to financial risk of a company have motivated scientists to start searching for a synthetic measure which would quickly and clearly provide company management with information about its financial situation in order to avoid the threat of bankruptcy.

A construction of the synthetic model consists of several stages. (Prusak, 2005 pp. 10-45) Currently a popular approach is the view that at the initial stage of the construction of the model, you must think about what purpose it will serve. The next step is to define a company, which is threatened with collapse according to the analysis carried out. Literature on the subject suggests that it may be a company which has filed for bankruptcy or where receiverships have already stepped in. For banks a sufficient premise may prove to be no regular payment of installments. Companies in good financial

standing are often chosen to undergo the expert method. The next stage is to try and choose a teaching sample used in the construction of the model. At this stage you need to answer the question whether the model is to have a universal character or if it is to be built for a specific branch of the industry. The size of a teaching sample will differ depending on this. The selection criterion for the study sample is mainly a balance sheet total or sales revenue. The next step is the selection of explanatory variables. Actually speaking, most commonly various financial ratios are used, although the need to apply other measures is also encouraged such as the quality of business management, the situation in the sector, or the overall economic situation. The most popular models used to assess the financial situation of entities are discriminatory models, which can be divided into the following groups: models based on comparing financial ratios (now rarely used because their performance is relatively low), linear models based on discriminatory functions. A one-dimensional discriminant function is to perform the classification of objects based on only one explanatory variable. It involves the selection of expert measures that should contribute to differentiating between the test groups. A multidimensional discriminant function provides a classification of objects by using several explanatory variables. Logit models in turn take the form of a binomial (bankrupt, not bankrupt) or polynomial (bankrupt, a company with a satisfactory financial standing, a good company). In the case of the binomial models a bankrupt is assigned the value 0, while a company with a good financial standing is assigned the number 1. The Logit function value, calculated with the use of financial ratios, is in the range (0,1). Depending on whether the function, for the test object, accepts a value closer to 0 or 1 the probability of bankruptcy will decrease or increase. In the case of the above-mentioned polynomial models a bankrupt is respectively attributed to the number 1, a company with a satisfactory financial condition to the number 2, and a good company to the number 3. In literature on the subject also known are probit models. Using a model, estimating the company's financial risk is also associated with the concept of border point. The object will be classified in relation to this point. It is the value of the corresponding function or the output value generated by the model, which will allow differentiation between a company at risk of bankruptcy from a company in good financial condition. In the case of such models as a multivariate linear discriminant function, assuming that the function has a normal distribution, the border point may be designated by using the average value of the function-score for bankrupts and non-bankrupts. Then the tested company will be classified as a bankrupt when the value of the discriminatory function is lower than the value of the border point. On the other hand it will be classified as a company in good financial condition when the resulting value is higher than the border point. In the case

of a linear discriminant function the value of the border point is 0. A similar procedure can be applied in the case of such techniques as the probit or logit analysis. These methods of analysis generate the value of the function z-score in the range <0,1>.

The first successful test of financial conditions using the synthetic measure was conducted in 1932, by P.J. Fritz Patrick, but the precursor to this approach and the creator of the first synthetic indicator of a financial condition of a company is believed to be Edward Altman. (Skoczylas& Waśniewski, 2004)

In Poland, the pioneers in this field were M. Pogodzińska and S. Sojak. (Pogodzińska & Sojak, 1995). The tested trial consisted of 10 companies coming from the Wroclaw area. These companies were not homogeneous in terms of industry and represented the following sectors: industrial, commercial, agricultural, and construction. The assessment of a financial situation of the companies was based on two variables – the quick indicator of liquidity and the gross profit margin. The multidimensional linear discriminant function had the following form:

Y = 0,644741 * X 1 + 0,912304 * X 2 where:

X 1 = (current assets-inventory)/short term liabilities

X 2 = the gross result/sales income

The border point = 0; intermediate zone <-0,454; 0,090>efficiency of the model at the border point = 0 was 92% a year before the filing for bankruptcy.

Research in the field of financial analysis as well as the search for a synthetic model used in the prediction of bankruptcy was continued by D. Wędzki (Wędzki, 2004, pp. 478-480), who carried out tests on a sample of 80 companies. Half of them were classified as firms in a good financial condition and the other half as bankrupts. During the test, companies which represented various sectors of industry were combined in pairs. In his research the author estimated 8 binomial logit models using from 2 to 8 indicators. When the classification function value exceeded 0.5 a unit was classified as a bankrupt company, below this value it was classified as a company in good financial condition. According to the author the best model from those estimated in the tests was the following function:

Y =-4 * X 1 + 2 * X 2 + 11, 441X3-4 where:

X 1 = (current assets + active accruals)/(short-term liabilities and special funds + accruals and deferred income)

X 2 = interest payable/(result on economic activity + interest payable)

X 3 = (reserves + long-term liabilities + short-term liabilities – special funds + accruals and deferred income) / balance-sheet total.

The efficiency of the overall model was 77.5%.

D. Hadasik presented 9 models built by using the multidimensional linear discriminatory analysis. The structure of the investigated companies was diverse, and included state-owned enterprises, limited liability companies, joint stock companies and cooperatives. The tested companies submitted an application for bankruptcy in the years 1991 to 1997 in regional courts in Poznan, Pila and Leszno. In the construction of models the following groups of indicators were used: liquidity ratios, debt ratios, performance and profitability indicators.

For example, Model 1 built by D. Hadasik (Hadasik, 1998, pp. 133-175) took the form of:

Y =-2, X 1 + X 2 * 0,001411478 * 50761 + 0,00925162 * X 3 + 0,0233545 * X 4 + P where:

X 1 = total liabilities/total assets

X 2 = receivables 365/sales revenue

X 3 = stock * 365/sales revenue

X 4 = the net result/stocks

P = constant = 2, 60839, The border point = 0

An issue related to forecasting bankruptcy was dealt with within the framework of research conducted by the Institute of Economic Sciences of the Polish Academy of Sciences. (Pieńkowska, 2004, pp.4-7) As a part of the research 7 models were estimated with the use of a multidimensional discriminant analysis. Statistical material used in the study consisted of 80 companies listed on the WSE. 40 of them were at risk of bankruptcy, while the remaining 40 were in good financial condition. These companies represented a variety of sectors: production, services and trade. The estimated models classify a unit to a group of companies at risk of bankruptcy at the moment when the value is less than 0.

Sample model rated at ECI MR. is as follows:

Y = X 1 + X 2 * 3,566 * 9,498 + 2,903 * X 3 + 0,452 * X 4 + P where:

X 1 = operating result/total assets

X 2 = value of equity/total assets

X 3 = net profit + depreciation/total liabilities

X 4 = current assets/short-term liabilities

P = constant =-1,658

The interest in the problem was also presented in the „Accounting" No. 5/2001 by A. Hołda in an article entitled *, Forecasting bankruptcy of a unit in the Polish economy using the discriminant ZH function.* The studies included 80 companies – half went bankrupt, while the other half were not affected by bankruptcy. The tested group was chosen on the basis of the EKD. The model proposed by the author is as follows in Table 4:

Table 4. A. Model Hołdy

Variables	Mark	Weight
X 1	current assets/short-term liabilities	+ 0,681
X 2%	total assets/total liabilities	-0,0196
X 3%	net income/total assets (average value)	0,00969
X 4 days	the average state of short-term liabilities/(cost of sales of products, goods and materials + SG + general overhead costs) x (360)	+ 0,000672
X 5 in times	revenue from sales/total assets (average value)	+ 0,157
constant		+ 0,605
The border point = 0 intermediate Zone (-0,3; 0,1), the efficiency of the model a 92.5% The efficiency of the model of 92.5%		

Source: A. Hołda (2001).

To summarize the issues related to the construction of models of business failure (Prusak, 2005, pp. 10-45) in our country we can indicate several characteristics: the tested group in most cases consisted of less than 100 units, in most studies balanced samples were used, financial information came from financial statements available a year or two years before filing for bankruptcy, non-homogeneous criteria was used for qualifying a company as a bankrupt (bankruptcy, liquidation because of poor financial status of the company, the initiation of agreement proceedings, bank agreement, opinion of bank experts), research carried out in Poland was not conducted on homogeneous enterprise groups, most commonly used were indicators of liquidity, profitability and those describing assets and capital structure of the company, mostly linear multi-dimensional discriminant analysis was used, the models enabled the qualifying of a company certainly reaching 90%, (including also models not mentioned in the work).

5. Conclusions

The problem of forecasting a company bankruptcy is a matter in the interest of many researchers. Course literature indicates that the most important advantage in terms of risk prediction models in Poland is their relatively high financial effectiveness, especially one year before filing for bankruptcy. The use of statistical models ensures proper quality in testing and is definitely better than the intuitive approach. (Prusak, 2010 pp. 45-48) Statistical models give an ability to change the approach to risk assessment by investors and also allow researchers to create a native pattern of bankruptcy adapted to Polish socio-economic realities.

According to the author of the article, the use of early warning models before the financial threat of a unit gives a chance to detect problems and modify the errors sufficiently in advance, and what is most important, provides an opportunity for moving a threatened company out of the crisis with the good will of its management. The author argues that bankruptcy is merely a natural regulator that eliminates the market out of economically little-effective units. Such a position is mainly the fact that the costs borne by the public in the case of the bankruptcy of enterprises are very high. According to the author, we should limit the possibility of such a phenomenon, and not treat it as a natural effect of the operation of a free market economy.

References

Boratyńska, K. (2009). Pomiar i klasyfikacja kosztów upadłości przedsiębiorstw na świecie i w Polsce. *Wieś Jutra*, 3, 175-185.

Dec, P. (2011). Aneks [in]: E. Mączyńska (Ed.) *Cykle życia i bankructwa przedsiębiorstw*. Warszawa: Oficyna Wydawnicza Szkoła Główna Handlowa.

Hadasik, D. (1998). Upadłość przedsiębiorstw w Polsce i metody jej prognozowania, *Zeszyty Naukowe Akademii Ekonomicznej w Poznaniu*, 153, 133-175.

Hołda, A. & Nowak, W. (2002). Metody estymacji ryzyka oszustwa przez niezależnych audytorów, *Zeszyty Teoretyczne Rachunkowości*, 8 (64), 74.

Hołda, A.(2001). Prognozowanie bankructwa jednostki w warunkach gospodarki polskiej z wykorzystaniem funkcji dyskryminacyjnej ZH, *Rachunkowość*, 5, 306.

Hołda, A.(2006). Zasada kontynuacji działalności i prognozowanie upadłości w polskich realiach gospodarczych, *Zeszyty Naukowe Akademii Ekonomicznej w Krakowie*, 174, 53-86.

Pałczyńska-Gościniak, R.(2001). Dylematy analizy finansowej w ocenie zasadności kontynuacji działalności przedsiębiorstwa, *Zeszyty Teoretyczne Rachunkowości*, 3(59), 14-24.

Pieńkowska, M. (2004). Przewidywanie kryzysu, *Nowe Życie Gospodarcze*, 13 (374), 4-7.

Pogodzińska, M., & Sojak, S. (1995). Wykorzystanie analizy dyskryminacyjnej w przewidywaniu bankructwa przedsiębiorstw, AUNC, *Ekonomia XXV*, 299, 53-61.

Prusak, B. (2005). *Nowoczesne metody prognozowania zagrożenia finansowego przedsiębiorstw,* Warszawa, Difin, 10-45.

Prusak, B.(2010). Zalety i ograniczenia modeli prognozowania zagrożenia przedsiębiorstw upadłością w: S. Morawska (Ed.), *Ekonomia i prawo upadłości przedsiębiorstw*, Warszawa: Oficyna Wydawnicza Szkoła Główna Handlowa w Warszawie.

Sokół, H. (2011). Przeżywalność przedsiębiorstwa. Czynniki wpływające na długość życia sektora MŚP w: E. Mączyńska (Ed.), *Cykle życia i bankructwa przedsiębiorstw* Warszawa: Oficyna Wydawnicza Szkoła Główna Handlowa .

Szczerbak, M., (2007). *Przyczyny upadłości przedsiębiorstw w Polsce*, [in]: B. Prusak, (ed), *Ekonomiczne i prawne aspekty upadłości przedsiębiorstw*, Warszawa: Difin.

Wędzki, D. (2004). *Logitowy model upadłości dla gospodarki polskiej – wnioski z badania* [in]: D. Zarzecki (ed.), *Czas na pieniądz Zarządzanie finansami – finansowanie przedsiębiorstw UE* t I, Szczecin: Wydawnictwo Uniwersytetu Szczecińskiego.

Waśniewski, T., & Skoczylas, W. (2004). *Teoria i praktyka analizy finansowej w przedsiębiorstwie*, Warszawa: Fundacja Rozwoju Rachunkowości w Polsce.

www.coface.pl,