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Detecting Financial Distress with the b-Sherrod Model: a Case Study

Thomas Arkan*

Abstract: The study points to the importance of studying and analysing the different concepts of financial distress and failure besides its role and importance in the performance evaluation of companies. The distress and failure of a company is considered to be the most important subject studied by academics and researchers as for the potential impacts that might result from it on the wealth of the stockholder, creditors and society. Therefore, many researchers started to find a method to detect and predict distress and failure to maintain the goal of survival and continuity of companies before the disaster happens. This study focused on using the B-Sherrod model which considered an advanced model to detect this phenomenon by testing the applicability of this model on a sample from a Kuwaiti manufacturing company. The study concluded that the B-Sherrod Model for detecting financial distress and prediction should be adopted as a reliable technique for the evaluation of a company's performance. Empirical test results showed the effectiveness of the Sherrod model in revealing financial distress that will help investors and other concerned users to visualize the ability of companies to continue.

Keywords: Financial Distress, the B-Sherrod model

Introduction

Over recent years, the topic of financial distress estimation has developed a major research domain in corporate finance, Financial distress simply means the decline of financial condition over several periods and this situation happens when a firm's cash flow conditions at some period do not match with the expected cash flows. Theoretically, business enterprises are assumed to operate eternally and their basic goal is to make a profit. While those business enterprises continue their successful operations, some of them cannot reach their goals and fall into financial failure mostly in the first two years of their existence. But growth and expansion does not mean that they will never come across failure or distress (Gitman 1992). The current financial crisis has already put many companies out of business all over the world. All this happened because they were not able to face the challenges of unexpected changes in the economy, corporate collapses are a natural phenomenon in business world, the legal and financial rights of stockholders, creditors, investors and other beneficiary parties became a very important task for financial managers to protect and manage analysts

* Arkan Thomas, Department of Economics, University of Szczecin; e-mail: danmarkkbh@yahoo.com.

to discover and reveal them. The failure of a firm yields harmful effects on these parties. For this reason, a priori assessment and predicting of corporate distress and failure can help them to take proactive actions against possible damages and losses in such situations. As the prediction of financial distress has informational value and creates substantial contributions for firm-related parties, many studies and research were carried out to develop properly working prediction models to an impending corporate failure. How can financial distress be predicted? This question is too important and not only interests managers but also external parties dealing with a company. These players are continuously seeking the optimal solution for performance estimation and forecasting, as a way to make rational decisions. Thus, the primary objective of this paper is to explore the different concepts of financial distress. The reasons that stand behind this phenomenon are: the stages of financial distress, failure and bankruptcy, studying and analysing the different prediction models. And finally applying and testing the B-Sherrod model on a selected company from the Kuwaiti market to discover the applicability and reliability of this model to detect this phenomenon.

1. Financial distress concepts and symptoms

There is no general agreement on the definition of financial distress. There are a wide range of definitions in the literature, some studies define distress as bankruptcies (Altman 1968), while others define distress as failure, or the inability to pay current obligations on maturity, Gibson believes that distress means that it is a company's inability to pay its dividend preference shares, short-term liabilities and interest on loans (Gibson 2010). Financial distress is a term in finance used to indicate a condition when promises to the creditors of a company are broken or honoured with difficulty". Ross (2012) defines financial distress as "is a situation where a firm's operating cash flows are not sufficient to satisfy current obligations (such as trade credits or interest expenses)" financial distress is defined in various contexts depending on the scope and rationale. (Rose 1996) linked financial distress to insolvency and defined it as: "Inability to pay one's debt and lack of means of paying one's debts. Such as the condition of a firm's assets and liabilities, the former is insufficient to discharge the latter." Wruck (1990) defines financial distress "as where net cash-flows are not adequate to pay off current liabilities for example interest cost or accruals''. In another way Altman and Hotckiss (*Corporate financial*... 2006) define failure "by economic criteria, means that the realized rate of return on invested capital, with allowances for risk consideration, is significantly and continually lower than prevailing rates on similar investments somewhat different economic criteria have also been utilized, including insufficient revenues to cover costs and where average return on investment is continually below the firm's cost of capital. These economic situations make no statements about the existence or discontinuance of the entity''. There is too much of a mix between terms of (distress, failure, bankruptcy), financial distress (is the situation when a firm's cash flow does not cover its financial obligations) could be considered the first symptom of financial failure while the failure might be the first

step on the road to bankruptcy (refers to the death of the company, when its assets are sold off and the organization ceases to exist).

Table 1

The differences between financial distress and financial failure

Financial distress	Financial failure
Shortage in returns	Totally stop paying obligations
Inability to pay obligations	Stopping activity and bankruptcy

Source: own schedule.

Altman & Hotchkiss On the other hand describe business failure in three ways:

1. Firstly, failure in terms of economic criteria is defined as: “the realized rate of return on invested capital is significantly and continually lower than prevailing rates on similar investments. It includes insufficient revenues to cover the costs and where the average return on investment is below the firm′s cost of capital”.
2. Secondly in terms of insolvency and is defined as “one that is not able to service its current debts due to the lack of liquidity and often culminates in a declaration of bankruptcy”.
3. Thirdly, the last term “default” occurs when a debtor is unable to meet the legal obligation of debt repayment.

From the previous definitions, the researcher did not conclude to a uniform definition of financial distress and thus I can define financial distress as, “That that stage in which the company up to the inability to repay short-term obligations, and not the ability to achieve operating profit and its inability to pay its expenses and operational investment and financing expenses and achieve consecutive losses year after year, which could eventually lead to bankruptcy and liquidation’’

2. Financial distress: reasons, phases and consequences

The phenomenon of financial distress is considered to be the most dangerous situation that may face a company because it gives the first warning signal to future financial difficulties and can be exposed to many businesses in both advanced and developing economies, the financial distress phenomenon takes place because of a combination factors. A survey conducted by the Dun Company show the most important reasons for distress as follows:

- inefficient management and staff 93.1%,
- negligence 2%,
- fraud 1%,
- disaster 0.9%,
- other reasons 3%.

Actually the main reason for the distress comes from a lack of liquidity and inability to pay outstanding obligations, but this is not the only reason for the distress because there are other reasons K.C.W. Chen and B.K. Church (1996) – R. Duda, P. Hart, D. Stork (2001), the most important reason for business failure can be shown as:

1. External Causes of Financial Distress: Companies are economic units and they are affected by and have impacts on the environment in which they operate. Therefore, some of the environmental factors causing business failure are beyond the control of the business. Although it is not possible to prevent these kinds of factors, it is possible to take on board some measures to reduce the adverse effects. The environmental factors that can lead businesses to failure are described below:

– A Social environment: One of the external reasons causing business failure is the social environment in which a company operates. A combination of economic conditions and behavioural patterns adopted by the population shapes the activities of business enterprises. Businesses, in order to be successful, are obliged to know the expectations of society and to continue their activities in accordance with these expectations. Avoidance of monopolistic Practices, respect for consumer rights, and environmental consciousness are some of the Social environments' expectations.

– Industrial Environment: In the sector, in which distressed companies operate, some ascent and descent can occur. These sectorial waves can affect many companies; therefore, companies come across financial distress, the repetition of these waves can lead companies to failure. For example; frequent strikes in a sector can lead companies into financial distress and distort their production decisions. Some of the sectorial risks are mentioned below.

  Fashion Risk, that is the incapability of companies to adapt to the choices and delights of consumers, and thus leads companies to failure.

  Value Chain Risk, a value-chain is a linked set of value-creating activities beginning with basic raw materials coming from suppliers, moving to a series of value-adding activities involved in producing and marketing a product or service, and ending with distributors getting the final goods into the hands of the ultimate consumer (Wheehlen 2012).

– Economic Environment: Businesses are part of the economic system and are affected by the economic conditions in the country in which they operate. Economic factors that can cause business failure can be listed as follows; a sudden increase or decrease in interest rates, unexpected changes in the inflation rate, exchange rate fluctuations, changes in the import and export regime and monetary policies.

– Natural Environment: Natural environment implies natural resources used in production. The development and evolution of a natural environment provides some opportunities that can lead to success in business operations and on the contrary can create some difficulties causing business failure as well. The depletion of natural resources

and environmental pollution has impacts on business activities. Moreover, natural disasters like earthquakes, floods, fires, epidemics, and animal diseases etc. can be listed as sample natural factors affecting business activities. Unfortunately, estimation and taking measures against natural disasters is very hard to achieve.

- Technological Environment: Depreciation of machinery and other production equipment can be given as examples of technological reasons for failures. Especially, rapid changes in technology and production techniques increase the intensity of competition and the uncertainty of the economic direction to follow.
- Legal and Political Environment: There are some laws (commercial law, tax law, codes of obligations, bankruptcy law, and so on) that businesses have to obey. The businesses that violate these laws are subject to various penalties and lose their reputation; hence, these negative events can be the cause of business failure.

2. Internal Factors: Internal factors, which are under the control of the a business, affecting business performance can be listed in general terms under the following headings (Keskin, 2002):

- poor management,
- dissonance to environmental development,
- insufficient communication,
- unbalanced growth,
- failure in the main projects.

Financial and accounting studies and literature revealed that companies pass certain stages before reaching the stage of bankruptcy and liquidation. These stages can be identified as follows:

1. The first phase (temporary financial distress) or known as the Pre-emergence of financial failure (evolutionary period): where the condition in which the company is makes it not possible to pay their outstanding obligations despite the fact that the company's assets exceed its liabilities, and this phase of distress is called the lack of liquidity in the short term. This phase has many of the negative phenomena, including:

- lack of demand for the products of the project,
- the weakness of the competitive position of the project,
- the significant increase in operating costs,
- low asset turnover,
- adoption of investment capital expansions without an adequate availability factor to contend with,
- lack of adequate banking facilities.

2. The second phase (real financial failure) or cash deficit: This is the phase when the company is unable to repay their outstanding obligations and the commitments are greater than its assets, a total deficit stage for payment even if time is given to re-patch. The main suffering at this phase is the inability to meet the current obligations and there is an urgent

need for cash, the problem lies in that assets are not liquid enough, in addition to the capital necessary factor frozen in inventory and accounts receivable and it must be noted that it is possible that economic loss occurs in this phase.

3. The third phase (financial meltdown) or (financial insolvency): where the company is unable to pay its expenses and mainly its debt burdens, and this case can be described by the organization as in the case of financial insolvency, where not be able to get through the usual channels for funding the necessary cash to meet their obligations to solve its due date, and at this point the administration may resort to new financial methods where there is little prospect for the continued growth of the organization and if you did not get the necessary funding, and may have in this case to sell bonds at a rate of return is relatively higher than the interest rate that can be accepted by the bondholder to invest his/her client with other similar institutions.

4. The fourth phase (total failure), (total insolvency): This stage is a critical point in the life of a company, it cannot avoid the recognition of the institution where all attempts at administration ends for additional funds to fail, and at this stage the total liabilities exceed the value of the assets of the institution and become a total failure and bankruptcy achieving legal steps.

5. The phase announcement or confirmation of bankruptcy: Occurs when legal action to protect the rights of lenders are taken, and thus being advertised for bankruptcy and liquidation and in this final stage the institution has reached the stage of failure. It is the stage where a company becomes unable to cope with the accrued liabilities and the property rights become inadequate because of large losses accumulated over years of work which have consumed all property rights which requires the liquidation of the company.

If a company is financially distressed, two things can happen. The company loses its technical liquidity or it comes to the edge of bankruptcy.

1. Loss of Technical Liquidity: the loss of technical liquidity means that a company is not able to pay its current liabilities or debts when they are on. Sometimes, although a company's total assets exceed total liabilities; the company may not be able to cover its debts. In such a situation, a company can start to pay a part of its debts; but cannot cope with further debts coming one after another. In such a case, financial distress is inevitable. Mostly, the loss of technical liquidity is caused by temporary problems such as deferred collection periods and the inability of fulfilling short-term liabilities. Measures, taken against the loss of technical liquidity can change from company to company.

2. Bankruptcy: the bankruptcy of a firm or becoming bankrupt can be defined as the inability of the firm to pay its debts; obviously, being bankrupt is much worse than losing technical liquidity. Although bankruptcy comes out with a steady decline of asset value below liabilities, deciding to put an end to the life of a business may be a better decision than trying to survive (Sewiadan 2003). If a company comes to the edge of bankruptcy, it would negotiate with its creditors or claim credits from banks, or file a bankruptcy petition to the courts. If a bankruptcy decision was taken, the company would act in two ways:

– – the company may engage in a reorganization process,
– – or it takes a liquidation decision.

3. Competitive Effect: the bankruptcy of a company can be seen as a positive event for the competitors of the bankrupt firm. This event is termed as the competitive effect in literature. According to the competitive effect, by the bankruptcy of the firm, competitors are affected positively and their market share increases and their stock prices are influenced positively on the return on equity.

4. The Contagion Effect: the bankruptcy of a company could indicate some problems common to other companies in the industry as well. According to the contagion effect, competitors are influenced negatively by the formation of pessimistic thoughts about the industry caused by the bankruptcy announcement of a company. While financial failure weakens the trust in the subject company, it could also reduce the credibility of the other companies in the same industry.

3. Model and empirical test

Over the last 40 years a lot of research has been carried out to explore and discover the situation of financial distress and failure, and to find the best model and methods that can detect this phenomenon. Accounting and financial management literature provides a wide range of models that can detect or predict the financial distress of companies, most of them have a common factor by depending on financial ratios in building models, some of them depend on a single ratio and others use a combination of ratios to build up a model and give different weights to each factor according to its significant and importance in recovering special factors such as liquidity and NI through the time frame. Many of the models built on the basis of an empirical test for distressed and successful companies over a spread of years.

Below are the most well-known papers on the issue.

1. Study of Altman (1968), financial ratios, discriminant analysis and the prediction of corporate bankruptcy**:** which can be considered as one of the most important studies conducted for forecasting failure? The study was aimed at determining the possibility of financial indicators in predicting the financial failure of a sample consisting of 22 companies including 11 struggling industrial companies, were used in this study and 22 financial ratios as independent variables. The study found that in the latter, the Z-score was used as a method of discriminatory analysis to build a linear function. The following percentages can predict distressed, failure and bankruptcy of companies:

– sales to total assets,
– earnings before interest and taxes to total assets,
– retained earnings to total assets,
– Financial Group to the top of the total assets,
– the market value of equity to book the value of total liabilities.

The model was able to predict the failure of companies in less than two years with an accuracy of 83%.

2. Study of Donald W. Beaver (1966), financial ratios as predictors of failure, Journal of accounting research. Beaver's idea was to develop a model to measure the failure of companies with a model adopted in the construction of the financial ratios; beaver conducted a major study in the field of forecasting firms, and was conducted on a sample of 79 companies in the period of 1954–1964. The study used in the analysis 30 financial ratios, the analysis analyses every single rate for five consecutive years and reached the final conclusion that the following ratios can be used more than others in predicting the failure of companies:

- cash flow to total debt,
- net income to total assets,
- total debt to total assets,
- operational head to college financial assets,
- current ratio.

Failed companies were also characterized by low inventory with a comparison with successful companies. The best non-asset Liquid ratios to predict the failure of companies are the estimates flow ratio to total liabilities and the ratio of net profit to total assets. In this study I will use **B-Sherrod's Failure Prediction Model:** which is one of the most modern models in predicting financial failure, this model depends on the six independent financial indicators, in addition to the relative weights of the discrimination function coefficients given for these variables, according to the following formula:

$$Z = 17X_1 + 9X_2 + 3.5X_3 + 20X_4 + 1.2X_5 + 0.1X_6,$$

where:

X_1 – net operation capital/total assets,
X_2 – current liquid assets/total assets,
X_3 – total equity/total assets,
X_4 – net income before income tax/total assets,
X_5 – total assets/total liabilities,
X_6 – total equity/total fixed assets.

From the weights given above to ratios we can observe two things:

1. The highest weight has been given to liquidity variables because of this model we have two key goals:
   a) assessing credit risk,
   b) assessing financial failure or continuity.

   The first goal (a) is used by banks to assess credit risk when granting loans to economic projects. The second objective of this model is used to ensure that the principle of the continuation of the company in its economic life to know the extent of the company's ability to carry out its activities in the future

2. the special value of the indicator of this model (Z) whenever it is high the degree of risk associated with financial distress and failure will be low and the opposite will be more critical and dangerous

Companies have been given five categories according to the degree of risk and to measure the ability to continue and these categories are in Table 2.

Table 2

Categories according to the degree of risk and to measure the ability

Category	Risk degree	Z
First	Company is not exposed to the risk of bankruptcy	Z > 25
Second	Little likelihood of exposure to the risk of bankruptcy	25 ≥ Z > 5
Thrid	Difficult to predict the risk of bankruptcy	20 ≥ Z > 5
Fourth	The Company is exposed significantly to the risk of bankruptcy	5 ≥ Z > –5
Fifth	The Company is exposed to the risk of bankruptcy	Z ≤ 5 –

Source: walid, hayali.

As it is shown in the table above the valuation degree to distress and failure depends on the (Z) value as an indicator on distress. Failure and bankruptcy:

1. If the (Z) value increases this means that the financial position of the company is strong and it has a very good chance to continue with a degree of low risk.
2. If the (Z) value decreases, this gives a sign to the difficulties facing the company to continue with a high degree of risk.

Table 2 refers to the financial indicators to a refrigeration and air conditioning company that worked in Kuwait in the period from 2004 to 2013 and have been calculated according to the Sherrod model: Variable results exist for the refrigeration and air conditioning Company according to the Sherrod model from 2004–2013

Table 3

Var	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
17*X1	0.410	0.391	0.351	0.156	–0.101	–0.088	–0.237	–0.348	–0.301	–0.251
9*X2	0.570	0.416	0.391	0.281	0.212	0.232	0.282	0.233	0.254	0.278
3.5*X3	0.294	0.274	0.221	0.186	0.096	0.032	–0.014	–0.126	–0.056	–0.012
20*X4	0.240	0.210	0.172	0.102	–0.324	–0.382	–0.35	–0.484	–0.350	–0.198
1.2*X5	1.992	1.725	1.531	1.352	1.207	1.015	1.039	0.931	0.980	1.125
0.1*X6	2.215	2.123	1.958	1.123	0.586	0.189	–0.048	–0.460	–0.380	–0.124
Z Value	20.54	17.83	15.73	9.606	–4.446	–5.699	–7.106	–12.920	–8.889	–4.695

Source: own table analysis.

From the Table 3 we can observe some important statistics:

1. The variable (X1 = working capital/total assets) was in a fixed rate in 2004–2007 while it decreased in 2008–2013.
2. The variable (X2 = liquid assets/total assets) was stable with a small variant during the years of study which means that the company still had a fixed rate of cash to face current and short-term obligations.
3. The variable (X3 = total equity/total assets) we can observe that it goes in a negative down slope during 2010–2013 which reflects the accumulation of losses in the last years.
4. The variable (X4 = net profit before income tax/total assets) we can observe that it also goes with a negative slope and the company starts losing its assets from 2008 to 2013.
5. The variable (X5 = total assets/total liabilities) it takes a negative slope during the period of study which reflects the tendency of the company either to borrow money or have difficulties in paying obligations or due amounts to lenders and creditors, it also means that there is a problem on the side of the different types of assets.
6. The variable (X6 = total equity/total fixed assets) also takes a negative down slope especially in the last years.
7. By analysing the (Z) value during the period of study we can observe the predictability of the model to financial distress especially in 2006–2007 which witnessed a big drop in the value of the Z-test and gives a strong signal to the financial failure in the years after and bankruptcy in the later years. The company passed through three levels of distress and failure:
   a) the first period from 2004 to 2007 which witnessed a drop in the Z value but not in the negative total result shows that the company still kept liquid assets that were bigger than the short term liabilities and with examining the components of current assets comparing with current liabilities we find a fluctuation in the current assets in an opposite direction increasing with a fixed rate in current liabilities which reflects the trend of borrowing money to cover future activities;
   b) the Z value from 2008–2011 goes negatively and this reflects the accurate predicting ability of the Sherrod model that companies will go through financial failure and a position of insolvency;
   c) 2012–2014 witnessed a slight improvement in the financial performance of the company where the Z value goes upwards but still negative, this reflects the increasing company activity to recover the losses of the previous year and this evidence is shown through the variable X4 which shows an improvement in net income comparing with the last years despite it still being negative.

Conclusions

Through studying and analysing the concepts and models of financial distress we can get some important conclusions and recommendations:

1. The phenomenon of financial distress and failure could be related to different reasons and factors but the most important one is the efficiency of the financial management in a company which plays the main role in sending different signals to top management and decision makers about the real financial situation of a company.
2. The Sherrod model has shown the excellent ability to detect and predict financial distress and failure three years before the phenomenom takes place and it gives a real proper warning in relevant time which reflects the value relevance of the information contained in this model.
3. The study revealed that a company which was selected from the Kuwaiti financial market suffered from financial distress and failure to a large extent especially after 2008, and this result was clearly shown by the Sherrod model.
4. Prediction models need to be more detailed through multi-variant ratios; models that go more deeply in analysing accounts and that change over time need to take into consideration the non-financial indicators beside the financial.

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WYKRYWANIE TRUDNOŚCI FINANSOWYCH W MODELU B-SHERRODA: STUDIUM PRZYPADKU

Streszczenie: Praca ta wskazuje na znaczenie badania i analizy różnych koncepcji trudnej sytuacji i porażek finansowych poza rolą i wagą oceny skuteczności spółek. Trudności i niepowodzenia firm są uważane za najistotniejsze tematy dla naukowców i badaczy ze względu na potencjalny wpływ, jaki mogą one wywrzeć na majątek akcjonariuszy, wierzycieli i społeczeństwo. Dlatego też wielu badaczy podjęło się znalezienia metody wykrywania i przewidywania trudności i niepowodzeń w celu umożliwienia firmie przetrwania i zachowania ciągłości działalności jeszcze przed porażką. Niniejsze badanie skoncentrowało się na zastosowaniu

modelu B-Sherroda, który uważany jest za najbardziej zaawansowany w wykrywaniu tego zjawiska, poprzez zbadanie stosowalności tego modelu na próbie pochodzącej z kuwejckiej firmy produkcyjnej. Analiza wykazała, że model B-Sherroda wykrywania i przewidywania trudności finansowych powinien zostać przyjęty jako wiarygodna technik oceny wydajności przedsiębiorstw. Empiryczne wyniki badania wykazały skuteczność modelu B-Sherroda w ujawnieniu trudności finansowych, co może pomóc inwestorom i innym interesariuszom zwizualizować zdolności przedsiębiorstwa do nieprzerwanej działalności.

Słowa kluczowe: trudności finansowe, model B-Sherroda

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