



The Development of Financial Soundness Index for Non-Financial Sector in Pakistan

Ehsan ul Hassan*, Dr. Zaemah bt. Zainuddin, Dr. Sabariah bt. Nordin

School of Economics, Finance and Banking, Universiti Utara Malaysia, Malaysia

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ABSTRACT

Pakistan is facing business failures for both large and small companies. A large number of bankruptcies have occurred in the last decade. Generally, financial soundness of the companies is determined with the comparison of latest and historical figures of individual financial ratios, especially with the ratios of high distress periods. Present study intends to develop a composite financial soundness index (FSI) for non-financial sector of Pakistan. The index will be developed for the non-financial sector as a whole and for individual sector too. The proposed methodology for the study is Variance-equal weighting method. The study also provides significant financial indicators with their ratios for the prediction of bankruptcy. The study is a beginning to develop financial soundness index for Pakistan. The index is a continuous measure that is capable of generating more information in the assessment of financial soundness of company.

KEYWORDS: Financial Soundness Index, Financial Distress, KSE, Variance-Equal Weighting Method, Financial Stability, Corporate Financial Failure

1. INTRODUCTION

Bankruptcy has been seen as one of the increasing threats to an organization in today's fast pace business environment. It happens when an organization fails to meet its liability and as a result, it may have to liquidate its assets to meet its debt obligation which is considered to be an adverse effect on the organization.

Financial distress is described as when a company does not have an ability to fulfil its financial obligations and often leads to bankruptcy in the long term. The existence of financial distress can be observed from many indicators such as consistent financial losses in consecutive years, drying cash flows, and other declines in revenues of the firm [53; 38].

Past researches have shown that many researchers focus more on the objective measures to understand bankruptcy risk (27; ;17; 31; 4]. In this regard, the Altman-Z score has been the center of attention as the measuring tool for bankruptcy. The Altman-Z score is a combination of several measures of performance and the risk to predict the score that signals bankruptcy risk. It has been witnessed that performances are the key ingredients that must be taken into account as a tool that measures bankruptcy. However, the performance can only be examined in accounting terms with respect to bankruptcy that has pure accounting related measures. The persistence and systematic nature of financial distress leads to negative effects on the economy. [24] stated that corporate sector is always sensitive towards economic condition of any country. This sensitivity can easily spread and increase financial shocks in the economy. In addition, these financial shocks increase stress level and weakens the country's macroeconomic resilience. Therefore, continuous occurrence of financial distress can increase the level of macroeconomic risks in a country.

Stages of Financial Distress

In financial distress, there are various stages in which an organization would fall into before leading to corporate failure. Each stage has different identical attributes and properties which consequently lead to the corporate failure. The transition within the stages depends on the volatile nature of financial conditions of the firm which affects the intensity of distress. On the other hand, good company's performance has been seen as a strong remedial factor which promotes financial stability that can help a company to survive from bankruptcy. However, the varying time frame of distress requires instantaneous recovery solution which would otherwise results in liquidation.

Corresponding Author: Ehsan ul Hassan, School of Economics, Finance and Banking, Universiti Utara Malaysia, Malaysia, 06010 UUM Sintok, Kedah, Malaysia; Email: ehsanulhassan786@gmail.com; Tel: +60 11 14282346

In this regard, it is very important to study the changes and behaviors of company finances over the time with certain measures. Furthermore, the complicated process of financial distress, can be understand through three main process which are; financial behavior over the time window, the overall impacts of various financial states and the features performance of the firm at different distress stages or states. Below is the diagram that illustrates the process of corporate failure.

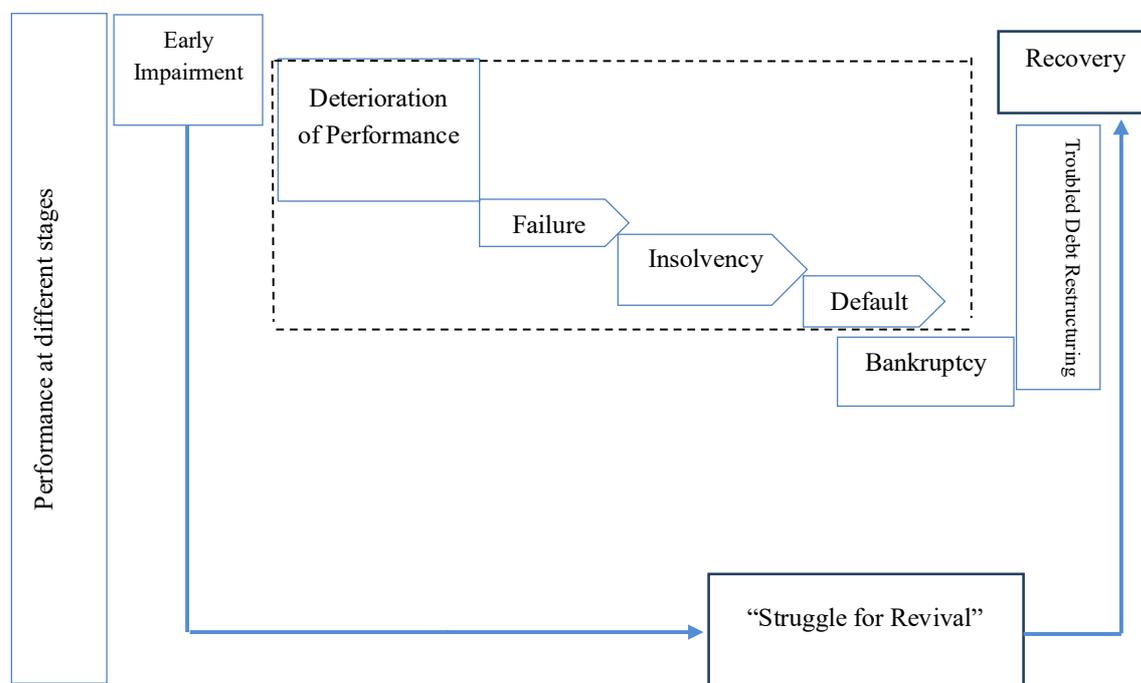


Figure 1: Process of corporate financial failure

Source: Authors

Figure 1 shows a multidimensional process of corporate failure consisting of, financial states and three stages of process as explained earlier. In the beginning of the time frame of this process, there is a mild decline in the company's performance and it will go down to the deepest point and then subsequent recovery from this crucial time period, which is also known as a financial distress cycle. Furthermore, it is difficult to analyze the average time frame of the failure process and the onset of the distress behavior due to difficulty to identify their sign and symptoms at their initial level.

The process of corporate failure contains different stages. The first stage is early impairment when the company may suffer with distress due to liquidation of its resources. However, the liquidation of resources does not seem to have adverse effects on organization's solvency situation. Commonly, in early stages of financial distress, it is very complicated to identify the existence of negative process due to solvency. However, the decline in liquidity leads to the next stage of financial distress.

The second stage occurs when severity in financial distress leads the company to liquidate its assets which adversely reduces the company's value at an alarming level [52]. Hence, this situation may cause financial instability in the company. Nevertheless, the financial distress does not always lead to default.

During the third stage, it will reveal continuous decline in the company's performance which push the company into financial distress. At this stage, company is facing operational dangers of profitability and liquidity. Now the company may become bankrupt and starts struggling for its survival. The company may regain its healthy position after restructuring its capital structure and other related activities, which is not an easy task. Furthermore, it is very difficult to estimate the length of financial distressed period due to unidentified starting point of distress.

Scherrer [56] highlights the snapshot behavior of financial distress as “*There are distinct phases of decline, and the danger signals vary with the stages. Sometimes not all of the symptoms appear; there is sufficient cause to worry if some occur*”. It is matter of fact the bankruptcy occurs in both developed and developing nations across the world. However, the occurrence rate is high in developing nations [22].

Indicators of Financial Distress

Previous researches point out various factors which caused higher bankruptcy rate such as different accounting practices, difference in capital structure, social and political situation in nations and adverse economic situation [9; 28; 46]. The absence of economic theory about the companies’ solvency indicates major problem in the financial failure models [43]. Hence, there is no consensus in the current empirical evidence on the exclusive variables that reflect the true image of understanding bankruptcy. Usually, ratios are used in empirical studies to forecast bankruptcy within the application of any econometric model. Often, the ratio groups share the same numeric value of numerator or denominator. These cause multicollinearity issues in the estimations. The multicollinearity generates biasness in estimated coefficients of the econometric models. The adverse effects continue as there is no systemic procedure which has the capability to identify ratios that can solve the duplication problem.

Usually, statistical considerations are taken into account for the selection of different financial ratios. Consequently, number of sub models will be generated from these ratios. For instance the initial number of financial ratios is K ; and probable sub models are $2k$. For $K=40$, the number of possible sub-models is 1099511627776. The computation of each model is excessively costly. For resolving this tricky issue, many heuristics methods have been used to smaller number of subsets of regress by corporate persons. For example, they use stepwise procedure such as backward elimination and forward selection which includes and excludes variables based on the t-statistic consideration [20]. The problem with the stepwise model is it may over identify the models. According to Lovell (1983), the model produces significant variables falsely at high rate. Researchers like [55; 29; 50; 2] propose other procedures for improving the criterion for selection of regressors.

[24] states that a crumbled corporate sector can weaken the flexibility of any country’s overall macroeconomics by transmitting or magnifying real or financial shocks which ultimately increases the macroeconomic risk of the country in the shape of high distress level for non-financial sector. The development of early warning indicators which measure vulnerabilities of balance sheet and therefore risk is critical. The latter is aimed at fulfilling the provision of answers which are related to the consequences of external shocks on the performance of the company and also to find out the response of economic authorities to these shocks.

According to [39] in previous studies mostly the analysis and interpretation of financial ratios is done to provide judgments about whether country’s non-financial companies are financially sound or not. Mostly studies focus on the aspects related to profitability, leverage, liquidity, operating performance, and others in relation to aggregate indicators. These financial attributes of companies were considered as main antecedents of default and fragility for non- financial companies.

Other than highlighting the positive aspects of evaluation of the overall financial soundness of non financial sector (for example, to have a look on financial attributes of the company), this study also have few limitations. Firstly, there is an absence of an overall measure to find out credit worthiness or one that helps to identify the risks of balance sheet. Central Bank determines the aspects of non-financial companies by separately investigating a specific group of financial ratios. At present the ratios used are return on assets, non-operating expense to the earnings before interests and taxes (EBIT), debt-asset ratio and current ratio as proxies of profitability, financial burden, indebtedness and liquidity respectively. This indicate that for a specific time frame, the general conclusion about the financial soundness of the companies is determined by comparing the current individual accounting ratios with the past ratios, particularly with the ratios of high distress periods.

As a developing country, Pakistan is facing business failures for both large and small companies. A large number of bankruptcies has occurred in the last decade. [57] reports that the stock exchanges are experiencing more delisting than listing of companies. From 2012 to 2016, 103 companies from the total of 578 companies has been delisted from the KSE under Liquidation / Winding up under court [37]. The Pakistan’s economy was affected badly. Therefore, it is necessary to investigate the ratios which are beneficial for the prediction of instability of companies.

This study indicates that a single financial indicator does not provide a complete measure of a company's financial health. An aggregate financial aspect should be analysed as a whole to evaluate the company's financial soundness. The composite analysis has been seen as polished approach to assess the company's financial position of a company.

In addition, this study is also aimed to provide an overview about the corporate sector's financial health, given the fact that the nature of financial ratios is not standardized according to the literature of accounting and finance. It is also showed that ratios do not have any predefined threshold to be obtained. On the other hand, there is no visible rule of thumb for the selection of financial ratios which are meant to truly measure the financial aspect of the company. Hence, there is a clear gap in the creation of formal criterion regarding the methodology which companies' management should follow while explaining the indicators of financial distress.

In this connection, this study intends to develop a composite financial soundness index (FSI) for non-financial sector of Pakistan. The index will be composed as a whole for the non-financial sector and also by sector. The measurement of creditworthiness of companies and forthcoming uncertain events and periods of high financial stress could be identified in early times. The indicator will be capable to offer a measurement of financial soundness and creditworthiness throughout the time and advise for the expected period of distress.

Rather relying on a few main indicators, as it is estimated in recent research, the idea is to develop a comprehensive index that captures the level of firm's financial health. Furthermore, a compound indicator should deliver an overall image of the industry's financial distress level and resolve the issue of examining individual and distinct indicators. The latter is for the purpose of attaining various inferences about firms' balance sheet performance and implications to the country's financial stability.

2. LITERATURE REVIEW

As the prediction of company's bankruptcy is important for a company's stakeholders and the company itself, numerous research studies have suggested different model to predict the financial failure [38; 40; 19; 6; 8; 1]. The financial bankruptcy is influenced by internal and external factors of the company and its probability is increasing day by day because of market competitiveness. The market follows the business process and eliminates firms which are unfit for that process [33].

[21] suggest that if there is more than one indicator presents to measure one variable, then the most suitable way is to form a composite metric which considers the effect of an individual metric. [14] and some other researchers have formed aggregate financial indices based on market data, but [44] have formed indices for financial stability of a company based on information available on financial statements of companies. [44] have studied the Columbian banking sector from January 1995 to November 2008 on monthly frequency. They have developed an index based on firms' profitability, liquidity and probability of financial failure to evaluate the continuous distress of banks. They used equally weighted variance method and principle component method with count data by employing regression method.

Instead, [14] form a qualitative and quantitative index based on business failure rate, ex post real interest rate, banks' loan charges and interest rate for time series to measure financial condition from 1934 to 1997. Similarly, [15] follow the same methodology to build an index measurement of stress for seventeen developed economies and Swiss banks for thirty years. One hundred and thirteen episodes were identified by this scale for measurement of financial distress among banks.

Additionally, [32] form a financial stress index for financial system of Canada using the data for the years 1997 to 2006. The purpose of this index is to categorize the firms on the basis of episodes of financial stress of 1997 to 2006, then aggregate them according to financial stress variable. Besides, it is acknowledged that the 'credit aggregate weighting technique' has the lowest errors (Type I & Type II) among all other methodologies of forming an index, and it offers expressive and cost effective weight for financial stress composition. Additionally, the index was formed by assigning weights to the variables on the basis of their market and size and then taking the weighted average of those variables. The firm having a larger share in the market was assigned more weight. Additionally, by using geometric and arithmetic means, the factor analysis and variance equal weight method were also tested in their study.

[10] study UK firms and advise the measure of financial fragility by using economic welfare (GDP) of general equilibrium model. The fragility is the amalgamation of low profitability and high default risk of banks, addressing the influence of policies (monetary and regulatory policies) and capital shocks in financial and real sectors. By using the Vector Autoregressive Model, they examined whether the welfare loss is caused by banks' distress. They concluded that the revenue of banks is significantly affected by its equity and the probability of banks' default.

[51] highlights a number of indices by using different methods in USA. Estimation from count data and signalling approach are two famous methods for composition of indices. Their results of indices developed by using principal factor analysis and variance equal method are different. Even though their results on evaluating the level of financial stress are different, the shape and cycle of financial stress indices are the same for the two methods. Normally, the credit risk and profitability ratios are used to form the indices, but [51] has also incorporated macroeconomic variables in the regression method.

[18] analyze the factors of financial crisis of emerging systematic banking from 1980 to 1994 in developed and developing economies. They show that crisis can arise in a weak macroeconomic environment especially when inflation is high and growth is low. Furthermore, the relationship between system vulnerability and financial liberalization is further analyzed and they conclude that the probability of financial failure increases with financial liberalization, and decreases with the improved macroeconomic environment. Hence, it is important to have a strong macroeconomic environment.

[45] analyzed the microeconomic and macroeconomic factors of banks' failures. They propose a model of bank failures based on liquidity risk, market risk and credit risk, and a logit model is used to estimate the bank failure by using a panel data. The researcher found that banks which are more prone to distress are those who have less equity and riskier loans. Similarly, [18] use the same methodology to develop a qualitative measure of banks' weaknesses during the banking crisis. Results show that in the context of multivariate logit model, early warning system will give a signal if the probability crosses certain threshold level of being in crisis.

[13] review recent research studies to assess leading indicators models. This study came up with two approaches to analyze the financial distress and crisis. The first approach includes models that estimate the impact of microeconomic factors (firm specific characteristics) on financial distress. The second approach uses macroeconomic factors as important explanatory variables of banking crisis. The study recognized two methods to develop financial stress indices; one is quantitative response models and the other is signaling method. The former used regression method to estimate the relationship of potential factors and gave an outcome that is financial crisis of a banking failure. The latter did comparison between the information of calm and crisis time periods keeping in view the Type I and Type II errors.

In some countries, the indices of financial stress have been used recently to assess the excellence or quality of financial system. [32], [26], [36] and [51] have formed indices for Switzerland, Canada and US. For the Swiss case, [26] form an index to evaluate the existing scenario of Swiss banks. They use macroeconomic information to increase estimate exercises for index, and results show that imbalances of macroeconomics impacts on the performance of banking sector in medium-run. This ultimately increases the probability of default.

In Canada, the ordinal measure was developed to measure the level of financial stress [32]. Several methods are used to develop an index such as a GARCH model, an econometric benchmarking, and a factor analysis. A survey of Canadian bank is used to choose the variables. Generally, the profitability ratios and credit risk ratios are being used to forecast the indices but [51] have also incorporated the macroeconomic variables in the study. [51] conducted a study in US and formed a number of indices through different methods. The study showed different results based on principal factor method and variance equal method. The point of contrast is the level of financial stress but shape and cycle of financial stress is same with these methods.

Even though there are various methods that were used to assess the financial distress, the logit model was one of the mostly used methods as compared to the others [47]. The other models of estimation of financial failure are given by different axioms and their computational complexities due to their different assumptions. Among them include Parametric: Expert systems [42], Artificial Neural Networks [58], Hybrid Classifiers for combining previous procedures [48] and mixed LOGIT models [35].

Several other classification methods have been applied in order to predict bankruptcy. These methods include Support Vector Machines (SVMs), Decision Trees (DTs), k-Nearest Neighbor (kNN), Neural Networks (NNs), Genetic Algorithms (GAs) etcetera. Research studies compare and contrast the accuracies of these methods in predicting bankruptcy and frequently focus to develop more elaborated methods which can help in bankruptcy prediction. A current trend is to build composite classifiers i.e. classifier ensembles and hybrid classifiers. The main idea of ensemble methods is to unite different classifiers, each of which solves the same task, in order to obtain a more accurate model [54].

3. RESEARCH METHODOLOGY

The data used for the analysis is gathered from the financial statements of non-financial companies which are listed on the Karachi Stock Exchange (KSE) of Pakistan. Extensive ratio analysis, which is categorized into five indicators, will be applied. Those indicators will be profitability, liquidity, leverage, assets efficiency and size-and-growth. These indicators are important because they are effective tools in the measurement of financial soundness of a company. Each indicator will be further categorizes into its own group of ratios which will directly evaluate the significance of the respective indicator. Table 1 shows the ratios used in the literature with their sources for five financial indicators of assets efficiency, leverage, profitability, liquidity and size-and-growth respectively.

Table 1: Ratios for each category of financial indicator

Label	Ratio	Indicator	Source
X ₁	$\left(\frac{\text{Net Profit}}{\text{Fixed Assets}}\right)$	Assets efficiency	Geng, Bose and Chen (2015)
X ₂	$\left(\frac{\text{Net Profit}}{\text{Total Assets}}\right)$	Assets efficiency	Chava and Purnananandan (2010)
X ₃	$\left(\frac{\text{Sales}}{\text{Total Assets}}\right)$	Assets efficiency	Bandyopadhyay (2006)
X ₄	$\left(\frac{\text{Longterm Debt}}{\text{Total Assets}}\right)$	Leverage	Agarwal and Bauer (2014)
X ₅	$\left(\frac{\text{Total Debt}}{\text{Shareholder's Equity}}\right)$	Leverage	Altman (2014)
X ₆	$\left(\frac{\text{Shareholder's Equity}}{\text{Longterm Debt}}\right)$	Leverage	Altman (2014)
X ₇	$\left(\frac{\text{Earning Before Interest \& Taxes}}{\text{Current Liabilities}}\right)$	Profitability	Rashid and Abbas (2011)
X ₈	$\left(\frac{\text{Earning Before Interest \& Taxes}}{\text{Sales}}\right)$	Profitability	Turetsky and McEwen (2001)
X ₉	$\left(\frac{\text{Net Profit}}{\text{Sales}}\right)$	Profitability	Rashid and Abbas (2011)
X ₁₀	$\left(\frac{\text{Earning Before Interest \& Taxes}}{\text{Total Assets}}\right)$	Profitability	Altman (2014)
X ₁₁	$\left(\frac{\text{Retained Earnings}}{\text{Total Assets}}\right)$	Profitability	Hu and Sathye (2015)
X ₁₂	$\left(\frac{\text{Earning Before Interest \& Taxes}}{\text{Total Liabilities}}\right)$	Profitability	Trujillo-Ponce, Samaniego-Medina and Cardone-Riportella (2013)
X ₁₃	$\left(\frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}\right)$	Liquidity	Allayannis, Brown and Klapper (2003)
X ₁₄	$\left(\frac{\text{Current Assets}}{\text{Current Liabilities}}\right)$	Liquidity	Yap et al. (2010)
X ₁₅	$\left(\frac{\text{Current Assets}}{\text{Total Assets}}\right)$	Liquidity	Urgurlu and Aksoy (2006)
X ₁₆	$\left(\frac{\text{Current Liabilities}}{\text{Total Assets}}\right)$	Liquidity	Geng, Bose and Chen (2015)
X ₁₇	$\log[(\text{TotalAssets})_t]$	Size	Altman (2014)
X ₁₈	$\log[(\text{Total Sales})_t]$	Size	Opler and Titman (1994)
X ₁₉	$(\text{Sales}_t - \text{Sales}_{t-1}) / \text{Sales}_{t-1}$	Growth	Chava and Purnananandan (2010)
X ₂₀	$(\text{Net Profit}_t - \text{Net Profit}_{t-1}) / \text{Net Profit}_{t-1}$	Growth	Nam, Kim, Park and Lee (2008)
X ₂₁	$(\text{Total Asset}_t - \text{Total Asset}_{t-1}) / \text{Total Asset}_{t-1}$	Growth	Jo, Han and Lee (1997)

Using the ratios highlighted in Table 1, this study will adopt a variance-equal weighting method to generate the index of financial soundness for the non-financial firms listed on the KSE.

The most common weighting method; Variance-equal weighting method will be used in the analysis. This method generates an index which gives equal importance to each of the variable. An assumption for this method is important that variables are to be normally distributed and before dividing the mean by standard deviation it is subtracted from every variable. Hence it is termed as “Variance equal weights”.

Prior literature related financial distress indicators are mostly assessed on the basis of their errors “Type I” and “Type II”. Type I error indicates the probability of failure of distress prediction. Type II error is the chance of incorrect indication a financial distress. The company’s management will cope with these issues to minimize them as per their elastic limit of loss function. It is proposed that using of similar kind of probabilistic evaluation criteria will be helpful where the results of current study are believed to indicate real events of occurrence of financial distress. The criterion for the indication of high stress event is if an index crosses the threshold of standard deviation which is two. Notably, the ranking of the measures does not change significantly due to choice of threshold.

4. SIGNIFICANCE OF THE STUDY

A measurement which can timely evaluate the financial mechanism and that can provide the quality indicator of the mechanism period by period; is a beneficial tool for financial regulators and policy makers as it can highlight the weaknesses of the mechanism. Moreover, such measures can help policy makers and financial regulators to take on time and effective regulatory decisions to minimize the impact of the instability periods and financial crises. Considering this fact, the calculated financial stability index can be used to measure the financial health of the non financial sector of Pakistan.

The index constructed for the study will weigh the most related accounting ratios that are suggested by past literature. The behavior of the index is likely to be quite accurate, and has a good index model that considers the period of low level of financial distress. Essentially, the index will forecast the financial crisis of the country few years prior to crises situation, during that the index shows sudden increase in the stress level. Another quality of the index, it is so simple and understandable and also it shows a quantifiable and continuous measurement along with an annual periodicity, which shows an exhaustive monitoring. One of the major contributions of this study is to provide measuring indicators for financial health at macro level that is at an aggregate level and by industry as well.

This paper would be a beginning point for developing early warning systems (EWS) with the help of a financial soundness index for Pakistan. Similarly, it is also expected that the index can be used as a base point for measuring the stability of financial system for future period, considering the fact that the index is a continuous measure that is capable of generating detailed information in the development of EWS than a binomial model where we describe if we are in crisis or not.

5. CONCLUDING REMARKS

The FSI assists in providing an ordinal measure which helps to predict financial bankruptcy. It serves as an initial effort to compute the financial stress level. At this point the variations in FSI are quite helpful in assessing the increase or decrease in the level of financial distress, and also for the estimation of time period for externalities.

The use of FSI is encouraged as a reference series for future research which can highlight the important indicators regarding bankruptcy prediction and assessment of financial soundness of non financial sector of Pakistan. Considering the fact that the FSI is a continuous-valued series, it is quite useful in establishing of a EWS. It can be regressed on several lagged variables which contain major information about crises or distress and then its results could be used to establish measures of financial fragility that will specify the probability of an exogenous extreme event affecting the degree of stress given perceived weaknesses in financial mechanism.

6. FUTURE RESEARCH

Researches in future study can also conduct some estimation of the FSI in order to get an insight regarding the financial health in future. For this it is important to create two different models: first, to regress an autoregressive model ARIMA knowing that all the vial information in forecasting the future values is available in the indicator history; second, to regress a multivariate model VECM in which macroeconomic variables are used as recommended by most of the prior literature.

Further research could also be done using the FSI to describe variations in the real economic variables for example investment and GDP. As tremendously high level of financial distress damages the financial mechanism and also play vital role in creating major losses for the economy. Low level of financial distress has lesser impact on real economy: such as, they can result in asset-price instability and tight liquidity conditions, both of these factors could result in reducing the private investment and consumption and increasing the cost of capital.

Future study could also be done by extending the approaches developed in the study to construct FSIs for different economies. It would be quite difficult to validate the results without performing professional financial surveys in other countries. Such FSIs could also be helpful if studied as a weighted combination like one based on financial linkages or trade; which will help in studying the external environment and financial contagion experienced by the non financial sector of Pakistan. This will ultimately serves as an important tool to analyze domestic macroeconomic levels as well as financial stability of the country.

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