

Financial Analysis and Implication on Sugar Sector of Pakistan using Altman's Z-score

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Abstract

Best economy of the country is the best source for the growth of industry, for the best economy there is the important role of industry, same sugar industry has its greater role. The objective of this research are to judge the power of financial ratios for evaluating sugar Z values and to look at the financial strength of the Pakistan sugar sector, the secondary data from 2011 to 2015 of 32 listed sugar firms has been taken to find out financial distress. The data withdraw added working capital, total assets, retained earnings, total liabilities and sales. The study recognized that the Altman's Z-score model was suitable for finding financial distress of the sugar industry. The study recommends the acceptance of Altman's model in predicting financial distress of the sugar industry.

Keywords: Sugar manufacturing, Financial distress, Altman Z-score.

Introduction

The Pakistani sugar industry is extremely fragmented with organized and unorganized producer. The unorganized producer mainly produce Gur and khandsari, the foes superior forms sugar. The industry accepts the potential to reconcile for the heavy and rising domestic sugar consumption and move up as a substantial power producer. The deliberations elaborate the economic operation and achievement of the country are the riches of the rural area, Gross Domestic Product (GDP), national income, per capita income and standard of livelihood. Corporate sector plays a critical part in contributing GDP. It is evinced that, the current data on industrial output shows an advance in the industrial growth over the preceding years (Davydenko, 2005; Gordon, 1971).

Pakistan is the fifth biggest producer of cabbage. The Sugar industry in Pakistan is the Second largest Agra based industry after Textiles. Today there are 82 functional sugar mills in the country out of which 45 are in Punjab, 32 in Sindh and 5 in Khyber Pakhtunkhwa. The total sugar production capacity is 6.8 million tons in a season and roughly six hundred thousand (600,000) tons per day. Capacity utilized is 60 to 70% depending upon sugar cane. Sugar has been grown in the country nearly achieving the target estimated production level of 3.1 million dozens. Nevertheless, the annual consumption is 4.2 million tons, thus the balance of 1.1 million tons is being imported to fill the gap. In golden years there is more sugar production than the requirements and in adverse years the state falls short resulting in imports. It has been reported that there has been no fruitful improvement in the country's economy during the last 15 years for the mere reason that the people concerned traders, industrialists and other establishments were not brought into confidence, while formulating policies (Myers and Jensen, 1986).

From the glowing picture of Pakistan's recent trends in various sectors, it is clear that corporate Pakistan should make usage of the resources effectively in order to handle the condition. No question, economic affluence largely depends on the efficiency of the corporate sector. The execution of a society can be dissected in many ways. It can be judged in respect to the marketplace, technology adoption, competitiveness, environmental security and strategic location. The execution of a troupe in the sugar area would naturally reflect the fiscal stability and maturation of the respective company terms of the financial parameter. Sugar industry one of the core manufacturing sectors, it is indispensable to recognize the extent to which the sector was regarded by the worldwide financial crisis. If the financial stability is not significantly affected, then it is equally significant to recognize the various properties that account for the sugar sector withstanding ability amidst this global recession.

Sugar sector upgraded from Rs 7.17 billion, to reach Rs.171.62 billion in 2015 and in 2014 it is Rs. 164.45 billion. Shareholders' Equity expressively upgraded by 5.96 percent over the previous year. Sales decayed with 5.55 percent and remained 9.19 billion. Exports decayed 11.19 billion, which is 28.69 in previous years. In contrary, sector earned significant Profit (before taxation) of 3.86 billion and upgraded with 2.93 billion. Profit After Tax was also increased by Rs. 2.44 billion in 2015. Reasons for improvement in profit are decreased Cost of Sales, Financial Expenses and enhanced Other Income during the year as compared to the preceding years. Due to probable scarcity of food supply, it is feared that in the upcoming days, the position may further travel down and naturally it will totally impress the foreign exchange reserves of the state in the long run.

Sugar cane is an important cash crop of Pakistan. It is primarily developed for bread and sugary production. It is an important source of income and utilization for the farming community of the state. It also constitutes an indispensable point for industries like sugar, chipboard, paper, barrages, confectionery, and use of chemicals, plastics, paints, synthetics, fibber, insecticides and detergents at the time of Pakistan's independence in 1947 there were just two sugar mills in the nation with a total output of 7,932 tons during the season of 1947-48. Then

during 1997-98 there were 75 sugar mills in the country producing 2.4 million metric tons of dough. Aside from the four factories located in the North West Frontier Province, which were based on sugar beet, all others used sugar cane as the cutting cloth. Most of the factories were situated in agricultural fields, close to sugarcane fields, from where the new material is secured. A number of chemicals, including lime, sulphur, phosphoric acid, bleaching powder, poly-electrolyte, floatation aid, and decolourant, are employed in the sugar making process. The measure of these chemicals varies from mill to mill due to different types of operations. Sugar cane production in the state has increased over time.

Literature Review

For corporate governance, prediction of distress has taken an important attention, indicate by many researchers. Gilson (1990); Datta and Iskandar-Datta (1995). The research, Telmoudi, Ghourabi, and Limam (2011) centralized on anticipation of financial position and performance of firms by pointing out that if early contingency plans can be identified with the failing firms, it can discourage managers from making poor investment decisions and from apply required actions that will help to counterbalance future losses.

It is the potential insolvency and the after effects associated with it that have made academic researchers from the whole world to keep under developed a large number of models regarding corporate failure prediction, based on many kinds of modeling proficiency (Aldrich & Nelson, 2007); (Simic, Evic, & Simic, 2012). Ross, Westerfield, Jaffe, and Jordan (2007) defined financial distress as a situation in which a firm does not have sufficient operating cash flows to satisfy current obligations and the firm is forced to take essential measures. In research, O'Leary (2001) gives an argument that anticipation of insolvency probably is single most significant tasks relating to business decision-making problems that influence the whole life span of a business as the failure results in a high cost from the all types of stakeholders and from the country's economy.

For every type of organization in the world bankruptcy became a topic of fear. For investment and other purpose financial report users are interested in financial capability. With the help of Financial capability, the shareholder can estimate a rate of restitution and the firm's creditor are also attracted to recognize the firm's debt paying power. The management and employees can also assess the financial ability of the business.

According to financial dictionary:

"The business failure or bankruptcy refers to a company concluding its operation following its incapability to make a profit or to bring in enough revenue to cover its expenses".

The financial distress can be calculated by using various approaches. With the use of these approaches, we can find the reason for failure. To check the estimated failure in past the usual ways of ratio analysis were used. According to Altman, most major ratios are those which calculate solvency, liquidity, and profitability. However, it seems tough which ratios are more significant. Different researchers used different ratios to calculate financial distress. Usual ratio analysis might present the incorrect results. Companies operating and financial difficulties can identify by financial ratio analysis.

Z-Score Model

Financially failure may take the method of bankruptcy or insolvency. Financial Bankruptcy refers to where a firm is not able to pay its obligations to its creditors or in other words when total liabilities exceeded from its total assets. Z-Score Model was developed by Edward Altman in 1968. Z-Score Model is the forecaster of insolvency by using the five specific ratios that predicts the financial distress of the companies. A Z - score model was built up under multiple discriminant analysis. Multiple Discriminant analysis is a method to split the different variables under a certain group with discriminant coefficients. Prediction of Insolvency is the very attractive factor for all investors and researchers to get the knowledge about the financial viability of the firms. Altman used 22 ratios in the procedure of producing Z-score Model and finalized five ratios which predict financial distress. Altman's results suggest that the Z-Score is an accurate predictor of bankruptcy up to two years prior to distress and that accuracy diminishes substantially as the lead time increases.

Research Methodology

Altman's original model has been taken to check the financial health and soundness of the firms.

Equation: $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.99X_5$

Where,

X_1 = Working Capital / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = Earnings before Interest and Taxes / Total Assets

X_4 = Market Value of Equity / Book Value of Debt

X_5 = Sales / Total Assets

These five independent variables will compute the Z-Value in order to quantify the financial viability of the firms. With this Model Altman has given the cut off scores to differentiate the bankrupt and non-bankrupt firms.

Cut Off Scores

Table 1: cut off sources

Cut Off Scores (Altman Z-Score 1968)		
Distress	Grey	Safe
<1.81	1.88 to 2.91	>2.99

The calculated Altman Z-Score can be classified and interpret into different three categories: firms that are expected to fail will have scores below 1.81 and companies that are financially strong will have scores greater than 2.99. Grey area falls between; 1.81 to 2.99 and it shows the critical situation of the firm where a firm have possibility to enter in Distress and safe zone. On the basis of these cut of scores given by Altman, the present study predicted financial position of Sugar industry in Pakistan.

Population and Sample Selection

Sugar industry of Pakistan is the 2nd largest manufacturing sector of Pakistan. There are 31 sugar companies listed in the Karachi Stock Exchange that have been selected as a population for this study

Data Collection and Arrangement

Data is collected from the financial statement analysis published by State Bank of Pakistan. After the completion of the required data to compute variables, the whole data is rearranged into panel data to take the desired outputs. Excel based analysis have been used to calculate the Z-Score value of the firm's financial statements.

Summary of Z-core

Table 2: summary

Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Sugar - Overall	2010	-0.1225	0	0	0.4312	1	2	Distress
Sugar - Overall	2011	-0.0568	0	0	0.35803	1	1	Distress
Sugar - Overall	2012	-0.0825	0	0	0.36897	1	1	Distress
Sugar - Overall	2013	-0.0867	0	0	0.42865	1	1	Distress
Sugar - Overall	2014	-0.11	0	0	0.42361	1	1	Distress
Sugar - Overall	2015	-0.1188	0	0	0.43293	1	1	Distress

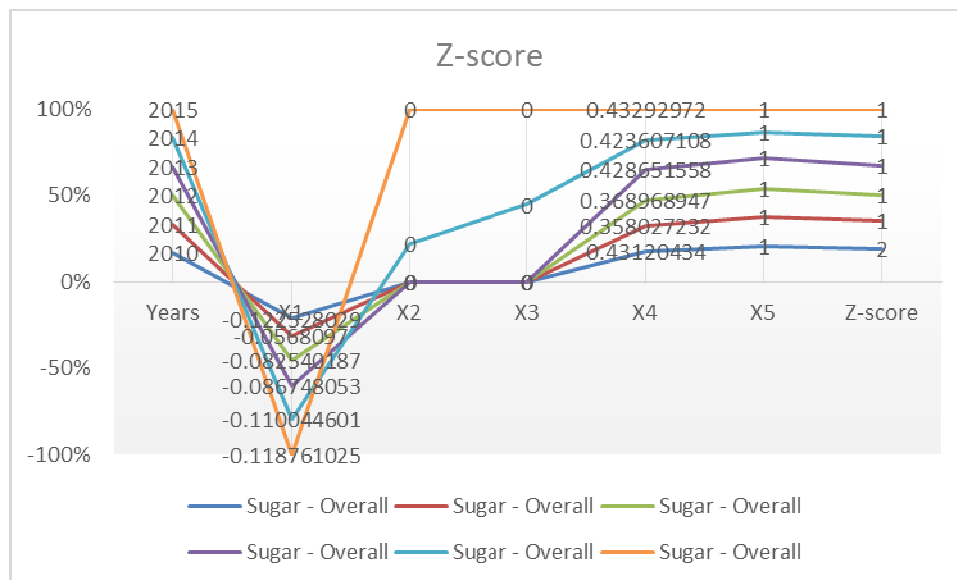


Fig 1: Z-score

Over all sugar industry in Pakistan is going to distress as shown above in table. The paper tells that over all sugar industry is bankruptcy after calculating the Altman z-score.

Table 3: Z-score table

Results of Z-score Model				
Year	Distress	Grey	Safe	Total
2010	15	11	5	31
2011	23	4	4	31
2012	24	4	3	31
2013	19	9	3	31
2014	20	7	4	31
2015	22	5	4	31

Table Shows, in 2010 there were 15 firms in financially distress zone, 11 firms were in grey area which could enter into distress or safe zone anytime and 5 firms out of 31 firms that were financially strong which is only 16% of the sample. 15 firms out of 31 were in bankruptcy zone that is 48.39% of the sample. In 2011, 23 firms were financially Distress and 4 firms were in the Grey Area. Result of z-score model shows there were 4 firms that was financially strong in this year. In 2012 sugar industry distress area increase, 24 firms were financially distress which is 77.42% of the sample and 4 firms were falling in Grey area, Similarly, there are only 3 firms that were financially strong and it is 9.7% of the sample.

There is significant positive change in the financial health of selected sugar industry in the recovery period. As given in the above table, there is major difference between crises and recovery period. In 2013, 3 firms were financially strong which is 9.67% of sample, 9 firms were in grey zone and 19 firms were financially distress according to the calculations of Z-Score model. The year 2014, 7 firms were laying in the Grey zone that could possibly be enter into financially safe zone firms or bankruptcy zone at any time and 4 firms were financially distressed in this year. In Last year of the Recovery period, Table shows that 22 firms of 31 were in bankruptcy zone, 5 firms were in Grey zone and 4 firms were financially strong this is 12.9% of total firms.

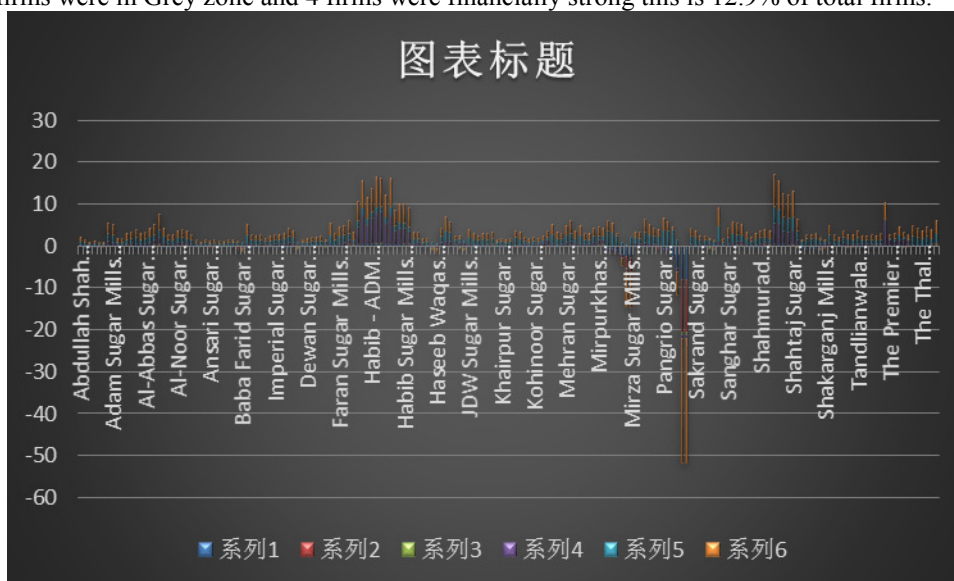


Fig 2: Z score chart

Conclusion

The paper indicates that 29% percentage of sugar industry of Pakistan is grey and safe zone. The paper concludes that this sector is currently not a best or good place for a investment for an investor. Study also proves that the regulatory authority must come up with more strict rules and regulations for monitoring and supervision. If due diligence is not taken as this sector is already going into loss it may have hostile effect on the economy of Pakistan. Altman z score model is perfect and efficient for the financial distress in any sector of economy before the assurance of bankruptcy or financial distress. The early detection of financial distress helps the management to make a better business decision a sound business decision is the main requirement for failure or success of business. The Z-score model used to calculate the bankruptcy of companies as well as maintaining and monitoring of companies being risk managed. The Altman models can be used to break that gap in the credit.

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Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Sugar - Overall	2010	-0.1225	0	0	0.4312	1	2	Distress
Sugar - Overall	2011	-0.0568	0	0	0.35803	1	1	Distress
Sugar - Overall	2012	-0.0825	0	0	0.36897	1	1	Distress
Sugar - Overall	2013	-0.0867	0	0	0.42865	1	1	Distress
Sugar - Overall	2014	-0.11	0	0	0.42361	1	1	Distress
Sugar - Overall	2015	-0.1188	0	0	0.43293	1	1	Distress
Abdullah Shah Ghazi Sugar Mills Ltd.	2010	0.00187	0	0	0.17858	1	1	Distress
Abdullah Shah Ghazi Sugar Mills Ltd.	2011	-0.0502	0	0	0.13124	1	1	Distress
Abdullah Shah Ghazi Sugar Mills Ltd.	2012	-0.0643	0	0	0.32946	0	0	Distress
Abdullah Shah Ghazi Sugar Mills Ltd.	2013	-0.0948	0	0	0.28613	0	0	Distress
Abdullah Shah Ghazi Sugar Mills Ltd.	2014	-0.184	0	0	0.27452	0	0	Distress
Abdullah Shah Ghazi	2015	-0.184	0	0	0.27452	0	0	Distress

Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Sugar Mills Ltd.								
Adam Sugar Mills Ltd.	2010	0.19261	0	0	0.88566	2	3	FALSE
Adam Sugar Mills Ltd.	2011	0.1712	0	0	0.7525	2	2	FALSE
Adam Sugar Mills Ltd.	2012	0.05015	0	0	0.30732	1	1	Distress
Adam Sugar Mills Ltd.	2013	0.03462	0	0	0.23668	1	1	Distress
Adam Sugar Mills Ltd.	2014	0.00396	0	0	0.50322	1	1	Distress
Adam Sugar Mills Ltd.	2015	-0.0426	0	0	0.7525	1	2	Distress
Al-Abbas Sugar Mills Ltd.	2010	-0.0302	0	0	0.4466	2	2	Distress
Al-Abbas Sugar Mills Ltd.	2011	-0.0329	0	0	0.34999	1	1	Distress
Al-Abbas Sugar Mills Ltd.	2012	-0.0251	0	0	0.57115	1	2	Distress
Al-Abbas Sugar Mills Ltd.	2013	-0.0377	0	0	0.88177	1	2	FALSE
Al-Abbas Sugar Mills Ltd.	2014	0.0344	0	0	1.0293	1	3	FALSE
Al-Abbas Sugar Mills Ltd.	2015	0.1011	0	0	1.71605	2	4	Safe
Al-Noor Sugar Mills Ltd.	2010	-0.0098	0	0	0.75928	1	2	FALSE
Al-Noor Sugar Mills Ltd.	2011	-0.0496	0	0	0.45183	1	1	Distress
Al-Noor Sugar Mills Ltd.	2012	-0.0122	0	0	0.40906	1	1	Distress
Al-Noor Sugar Mills Ltd.	2013	0.07788	0	0	0.64466	1	2	Distress
Al-Noor Sugar Mills Ltd.	2014	0.04939	0	0	0.60092	1	2	FALSE
Al-Noor Sugar Mills Ltd.	2015	0.06738	0	0	0.57917	1	2	Distress
Ansari Sugar Mills Ltd.	2010	0.0303	0	0	0.47701	1	1	Distress
Ansari Sugar Mills Ltd.	2011	-0.0189	0	0	0.23126	0	1	Distress
Ansari Sugar Mills Ltd.	2012	-0.0738	0	0	0.10792	0	0	Distress
Ansari Sugar Mills Ltd.	2013	0.00613	0	0	0.29684	1	1	Distress
Ansari Sugar Mills Ltd.	2014	-0.089	0	0	0.20423	0	0	Distress
Ansari Sugar Mills Ltd.	2015	-0.0561	0	0	0.29477	0	1	Distress
Baba Farid Sugar Mills Ltd.	2010	-0.0658	0	0	0.04457	1	1	Distress
Baba Farid Sugar Mills Ltd.	2011	-0.0803	0	0	0.28831	0	0	Distress
Baba Farid Sugar Mills Ltd.	2012	-0.2438	0	0	0.17943	1	1	Distress
Baba Farid Sugar Mills Ltd.	2013	-0.3132	0	0	0.12333	1	0	Distress
Baba Farid Sugar Mills Ltd.	2014	-0.2629	0	0	0.16554	1	0	Distress
Baba Farid Sugar Mills Ltd.	2015	-0.3787	0	0	0.09821	1	0	Distress
Chashma Sugar Mills Ltd.	2010	-0.0321	0	0	0.47212	2	2	FALSE
Chashma Sugar Mills Ltd.	2011	-0.0178	0	0	0.41107	1	1	Distress
Chashma Sugar Mills Ltd.	2012	-0.0553	0	0	0.31489	1	1	Distress
Chashma Sugar Mills Ltd.	2013	-0.0292	0	0	0.50894	1	1	Distress
Chashma Sugar Mills Ltd.	2014	-0.078	0	0	0.35219	1	1	Distress
Chashma Sugar Mills Ltd.	2015	-0.1225	0	0	0.34295	1	1	Distress
Imperial Sugar Mills Ltd.	2010	-0.1391	0	0	0.44549	1	1	Distress
Imperial Sugar Mills Ltd.	2011	-0.1721	0	0	0.42812	1	1	Distress
Imperial Sugar Mills Ltd.	2012	-0.1804	0	0	0.47492	1	1	Distress
Imperial Sugar Mills Ltd.	2013	-0.1659	0	0	0.76256	2	2	FALSE
Imperial Sugar Mills Ltd.	2014	-0.2464	0	0	0.64216	1	2	Distress
Imperial Sugar Mills Ltd.	2015	-0.2878	0	0	0.41491	0	0	Distress
Dewan Sugar Mills Ltd.	2010	-0.3623	0	0	0.2646	1	0	Distress
Dewan Sugar Mills Ltd.	2011	0.15895	0	0	0.10724	1	1	Distress
Dewan Sugar Mills Ltd.	2012	0.15798	0	0	0.12103	1	1	Distress
Dewan Sugar Mills Ltd.	2013	0.09682	0	0	0.21292	1	1	Distress
Dewan Sugar Mills Ltd.	2014	0.04153	0	0	0.20622	1	1	Distress
Dewan Sugar Mills Ltd.	2015	-0.0717	0	0	0.20728	1	0	Distress

Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Faran Sugar Mills Ltd.	2010	0.07332	0	0	0.41853	2	3	FALSE
Faran Sugar Mills Ltd.	2011	0.02698	0	0	0.28514	1	1	Distress
Faran Sugar Mills Ltd.	2012	-0.0012	0	0	0.64298	2	2	FALSE
Faran Sugar Mills Ltd.	2013	-0.0036	0	0	0.84711	2	2	FALSE
Faran Sugar Mills Ltd.	2014	0.05185	0	0	0.83255	2	3	FALSE
Faran Sugar Mills Ltd.	2015	0.03316	0	0	0.5068	1	2	Distress
Habib - ADM Ltd.(Habib Arkady LTD.)	2010	0.41347	0	0	4.10738	2	5	Safe
Habib - ADM Ltd.(Habib Arkady LTD.)	2011	0.44957	0	0	6.94229	2	6	Safe
Habib - ADM Ltd.(Habib Arkady LTD.)	2012	0.49356	0	0	4.69636	1	5	Safe
Habib - ADM Ltd.(Habib Arkady LTD.)	2013	0.52513	0	0	6.22945	1	6	Safe
Habib - ADM Ltd.(Habib Arkady LTD.)	2014	0.52656	0	0	7.0233	1	7	Safe
Habib - ADM Ltd.(Habib Arkady LTD.)	2015	0.5704	0	0	7.4611	1	7	Safe
Habib Sugar Mills Ltd.	2010	0.41257	0	0	4.87522	2	5	Safe
Habib Sugar Mills Ltd.	2011	0.46573	0	0	7.05513	2	7	Safe
Habib Sugar Mills Ltd.	2012	0.25694	0	0	3.3161	1	4	Safe
Habib Sugar Mills Ltd.	2013	0.46601	0	0	3.70112	1	4	Safe
Habib Sugar Mills Ltd.	2014	0.39045	0	0	3.55779	1	5	Safe
Habib Sugar Mills Ltd.	2015	0.34319	0	0	2.91502	1	5	Safe
Haseeb Waqas Sugar Mills Ltd.	2010	-0.0674	0	0	0.58662	1	1	Distress
Haseeb Waqas Sugar Mills Ltd.	2011	0.02623	0	0	0.91644	1	1	Distress
Haseeb Waqas Sugar Mills Ltd.	2012	-0.0147	0	0	0.48046	0	1	Distress
Haseeb Waqas Sugar Mills Ltd.	2013	-0.1547	0	0	0.33235	1	1	Distress
Haseeb Waqas Sugar Mills Ltd.	2014	-0.2895	0	0	0.30375	0	0	Distress
Haseeb Waqas Sugar Mills Ltd.	2015	-0.2134	0	0	0.08166	0	-1	Distress
Husein Sugar Mills Ltd.	2010	-0.2235	0	0	0.93378	1	2	Distress
Husein Sugar Mills Ltd.	2011	0.01103	0	0	1.12376	2	3	Safe
Husein Sugar Mills Ltd.	2012	-0.1756	0	0	1.05695	2	2	FALSE
Husein Sugar Mills Ltd.	2013	-0.2455	0	0	0.35536	1	1	Distress
Husein Sugar Mills Ltd.	2014	-0.275	0	0	0.82952	1	1	Distress
Husein Sugar Mills Ltd.	2015	-0.3062	0	0	0.65781	1	0	Distress
JDW Sugar Mills Ltd.	2010	-0.0857	0	0	0.38913	2	2	Distress
JDW Sugar Mills Ltd.	2011	-0.0701	0	0	0.31942	1	1	Distress
JDW Sugar Mills Ltd.	2012	-0.1601	0	0	0.269	1	1	Distress
JDW Sugar Mills Ltd.	2013	-0.1394	0	0	0.2524	1	1	Distress
JDW Sugar Mills Ltd.	2014	-0.1735	0	0	0.1821	1	1	Distress
JDW Sugar Mills Ltd.	2015	-0.2152	0	0	0.23217	1	2	Distress
Khairpur Sugar Mills Ltd.	2010	-0.3451	0	0	0.12335	1	0	Distress
Khairpur Sugar Mills Ltd.	2011	-0.2023	0	0	0.12184	1	1	Distress
Khairpur Sugar Mills Ltd.	2012	-0.2407	0	0	0.01548	1	1	Distress
Khairpur Sugar Mills Ltd.	2013	-0.322	0	0	-0.1058	1	1	Distress
Khairpur Sugar Mills Ltd.	2014	-0.2319	0	0	0.02368	2	2	Distress
Khairpur Sugar Mills Ltd.	2015	-0.1148	0	0	0.06428	1	2	Distress
Kohinoor Sugar Mills Ltd.	2010	-0.0807	0	0	0.40492	1	1	Distress

Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Kohinoor Sugar Mills Ltd.	2011	-0.1096	0	0	0.28113	1	1	Distress
Kohinoor Sugar Mills Ltd.	2012	-0.1971	0	0	0.51968	1	1	Distress
Kohinoor Sugar Mills Ltd.	2013	0.01698	0	0	0.6023	0	1	Distress
Kohinoor Sugar Mills Ltd.	2014	0.00195	0	0	0.7014	1	1	Distress
Kohinoor Sugar Mills Ltd.	2015	0.02425	0	0	1.50737	1	1	Distress
Mehran Sugar Mills Ltd.	2010	-0.0256	0	0	0.43069	2	2	FALSE
Mehran Sugar Mills Ltd.	2011	-0.0157	0	0	0.34076	1	2	Distress
Mehran Sugar Mills Ltd.	2012	0.00491	0	0	0.41543	1	1	Distress
Mehran Sugar Mills Ltd.	2013	0.06207	0	0	0.71772	2	2	FALSE
Mehran Sugar Mills Ltd.	2014	0.07003	0	0	0.93769	2	3	Safe
Mehran Sugar Mills Ltd.	2015	0.06165	0	0	0.6369	1	2	FALSE
Mirpurkhas Sugar Mills Ltd.	2010	-0.0628	0	0	0.59462	2	2	FALSE
Mirpurkhas Sugar Mills Ltd.	2011	0.03014	0	0	0.37446	1	1	Distress
Mirpurkhas Sugar Mills Ltd.	2012	0.01556	0	0	0.5707	1	1	Distress
Mirpurkhas Sugar Mills Ltd.	2013	0.05326	0	0	0.88943	1	2	FALSE
Mirpurkhas Sugar Mills Ltd.	2014	0.01133	0	0	1.04564	1	2	FALSE
Mirpurkhas Sugar Mills Ltd.	2015	0.15851	0	0	1.12764	1	2	FALSE
Mirza Sugar Mills Ltd.	2010	-0.6695	0	0	-0.5671	4	2	FALSE
Mirza Sugar Mills Ltd.	2011	-0.5919	0	0	-0.5125	3	2	FALSE
Mirza Sugar Mills Ltd.	2012	-1.1766	0	0	-0.5152	2	1	Distress
Mirza Sugar Mills Ltd.	2013	-2.0538	0	0	-0.6633	1	-2	Distress
Mirza Sugar Mills Ltd.	2014	-2.4118	-3	0	-0.7046	0	-8	Distress
Mirza Sugar Mills Ltd.	2015	-2.7201	-3	0	-0.7325	2	-8	Distress
Noon Sugar Mills Ltd.	2010	-0.2932	0	0	0.84653	1	1	Distress
Noon Sugar Mills Ltd.	2011	-0.1618	0	0	0.47725	1	1	Distress
Noon Sugar Mills Ltd.	2012	-0.1362	0	0	0.8248	3	3	FALSE
Noon Sugar Mills Ltd.	2013	-0.1595	0	0	0.56337	2	2	FALSE
Noon Sugar Mills Ltd.	2014	-0.2031	0	0	0.40973	2	2	Distress
Noon Sugar Mills Ltd.	2015	-0.2733	0	0	0.37881	2	2	Distress
Pangrio Sugar Mills Ltd.	2010	-0.6707	0	0	-0.6516	4	3	FALSE
Pangrio Sugar Mills Ltd.	2011	-0.574	0	0	-0.579	3	2	FALSE
Pangrio Sugar Mills Ltd.	2012	-2.4453	0	0	-0.8174	4	1	Distress
Pangrio Sugar Mills Ltd.	2013	-5.3533	0	0	-0.898	1	-5	Distress
Pangrio Sugar Mills Ltd.	2014	-8.0999	-13	-1	-0.9178	0	-30	Distress
Pangrio Sugar Mills Ltd.	2015	-8.0999	-13	-1	-0.9178	0	-30	Distress
Sakrand Sugar Mills Ltd.	2010	-0.031	0	0	0.47819	2	2	FALSE
Sakrand Sugar Mills Ltd.	2011	-0.1139	0	0	0.29485	2	2	Distress
Sakrand Sugar Mills Ltd.	2012	-0.1505	0	0	0.41138	1	1	Distress
Sakrand Sugar Mills Ltd.	2013	-0.3025	0	0	0.21733	1	1	Distress
Sakrand Sugar Mills Ltd.	2014	-0.3133	0	0	0.42465	1	0	Distress
Sakrand Sugar Mills Ltd.	2015	-0.388	0	0	0.3468	1	0	Distress
Sanghar Sugar Mills Ltd.	2010	0.08498	0	0	0.95454	4	4	Safe
Sanghar Sugar Mills Ltd.	2011	0.00373	0	0	0.2814	1	1	Distress
Sanghar Sugar Mills Ltd.	2012	-0.0062	0	0	0.39903	2	2	FALSE
Sanghar Sugar Mills Ltd.	2013	0.00957	0	0	0.68239	2	3	FALSE
Sanghar Sugar Mills Ltd.	2014	-0.0078	0	0	0.77618	2	3	FALSE
Sanghar Sugar Mills Ltd.	2015	0.04092	0	0	0.82764	2	3	FALSE
Shahmurad Sugar Mills Ltd.	2010	-0.0477	0	0	0.36962	1	2	Distress

Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
Shahmurad Sugar Mills Ltd.	2011	-0.0102	0	0	0.24489	1	1	Distress
Shahmurad Sugar Mills Ltd.	2012	-0.0431	0	0	0.33641	1	1	Distress
Shahmurad Sugar Mills Ltd.	2013	-0.0672	0	0	0.43318	1	2	Distress
Shahmurad Sugar Mills Ltd.	2014	-0.019	0	0	0.50157	1	2	FALSE
Shahmurad Sugar Mills Ltd.	2015	0.01068	0	0	0.47713	1	2	FALSE
Shahtaj Sugar Mills Ltd.	2010	0.46213	0	0	5.02763	4	7	Safe
Shahtaj Sugar Mills Ltd.	2011	0.57041	0	0	4.78398	3	7	Safe
Shahtaj Sugar Mills Ltd.	2012	0.45553	0	0	3.0842	3	6	Safe
Shahtaj Sugar Mills Ltd.	2013	0.32744	0	0	3.05776	3	5	Safe
Shahtaj Sugar Mills Ltd.	2014	0.30565	0	0	3.53259	3	6	Safe
Shahtaj Sugar Mills Ltd.	2015	0.12759	0	0	1.2181	2	3	FALSE
Shakarganj Mills Ltd.	2010	-0.7145	0	0	0.06338	1	0	Distress
Shakarganj Mills Ltd.	2011	-0.6629	0	0	0.0307	2	1	Distress
Shakarganj Mills Ltd.	2012	-0.5185	0	0	0.21014	2	1	Distress
Shakarganj Mills Ltd.	2013	-0.5896	0	0	0.32601	2	1	Distress
Shakarganj Mills Ltd.	2014	-0.4163	0	0	0.59768	1	0	Distress
Shakarganj Mills Ltd.	2015	-0.3906	0	0	0.50821	0	0	Distress
Sindh Abadgar'S Sugar Mills Ltd.	2010	0.0426	0	0	0.61266	2	2	FALSE
Sindh Abadgar'S Sugar Mills Ltd.	2011	0.07939	0	0	0.34745	1	1	Distress
Sindh Abadgar'S Sugar Mills Ltd.	2012	0.02358	0	0	0.29855	1	1	Distress
Sindh Abadgar'S Sugar Mills Ltd.	2013	-0.0806	0	0	0.67522	1	2	Distress
Sindh Abadgar'S Sugar Mills Ltd.	2014	-0.0851	0	0	0.50354	1	1	Distress
Sindh Abadgar'S Sugar Mills Ltd.	2015	-0.0061	0	0	0.42224	1	1	Distress
Tandlianwala Sugar Mills Ltd.	2010	-0.1795	0	0	0.41545	2	2	Distress
Tandlianwala Sugar Mills Ltd.	2011	-0.1104	0	0	0.44795	1	1	Distress
Tandlianwala Sugar Mills Ltd.	2012	-0.0435	0	0	0.58855	1	1	Distress
Tandlianwala Sugar Mills Ltd.	2013	-0.1523	0	0	0.3991	1	1	Distress
Tandlianwala Sugar Mills Ltd.	2014	-0.1508	0	0	0.36777	1	1	Distress
Tandlianwala Sugar Mills Ltd.	2015	-0.184	0	0	0.40086	1	1	Distress
The Premier Sugar Mills & Distillery Co. Ltd.	2010	0.28538	0	0	5.88818	0	4	Safe
The Premier Sugar Mills & Distillery Co. Ltd.	2011	0.09421	0	0	1.33945	0	1	Distress
The Premier Sugar Mills & Distillery Co. Ltd.	2012	0.0121	0	0	1.0738	1	1	Distress
The Premier Sugar Mills & Distillery Co. Ltd.	2013	-0.0306	0	0	1.52381	1	2	FALSE
The Premier Sugar Mills	2014	0.0078	0	0	1.70712	0	1	Distress

Sugar Industry Work Sheet								
Companies Name	Years	X1	X2	X3	X4	X5	Z-score	Zone
& Distillery Co. Ltd.								
The Premier Sugar Mills & Distillery Co. Ltd.	2015	0.05495	0	0	1.33551	0	1	Distress
The Thal Industries Corporation Ltd.	2010	0.03281	0	0	0.254	2	2	FALSE
The Thal Industries Corporation Ltd.	2011	0.06148	0	0	0.23707	2	2	FALSE
The Thal Industries Corporation Ltd.	2012	0.07773	0	0	0.20857	2	2	Distress
The Thal Industries Corporation Ltd.	2013	0.00247	0	0	0.27525	2	2	FALSE
The Thal Industries Corporation Ltd.	2014	0.03398	0	0	0.20404	1	2	FALSE
The Thal Industries Corporation Ltd.	2015	0.04417	0	0	0.32258	2	3	Safe