Predicting Corporate Financial Distress for Widely Held Large - Cap Companies in India : Altman Model vs. Ohlson Model

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Abstract

In the present study, an attempt was made to compare the prediction accuracies of Altman's *Z* - score model and Ohlson's *O* - score model, primarily in predicting financial distress for widely held large cap companies in India. Over a period of 2000 to 2013, a sample of 15 financially distressed and a paired control sample of 30 financially non - distressed widely held large cap companies belonging to 15 different industries were taken up for the study. The comparative analysis of the rate of prediction accuracies of both the models unearthed that in predicting the financial distress for the companies, the prediction accuracy of Ohlson model was rather higher. In contrast, in predicting the overall financial health (both financial distress and non-distress) of the companies as well as in predicting the financial soundness (financial non-distress) of the companies, the prediction accuracy of the Altman model was found to be greater. However, the Pearson chi-square test of significance revealed that the prediction accuracy of the Altman model in predicting financial soundness of widely held large cap companies in India was statistically significantly higher than that of the Ohlson model. Furthermore, though both the models showed high levels of prediction accuracy in predicting financial health as well as financial distress of widely held large cap companies in India, their prediction accuracies did not vary significantly.

Key words : **Altman's *Z* - score model, bankruptcy, corporate failure, debt default, financial distress, leverage, logit analysis, multiple discriminant analysis, Ohlson's *O* - Score model, ratio analysis, solvency**

JEL Classification : C52, C53, G20, G32, G33, M40

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Predicting corporate financial distress not only helps in understanding the risk levels of the organization, but more appropriately addresses a core issue of the economy, particularly when the prediction relates to the widely held large cap companies. In general, various quantitative models have been developed in this end, used current financial data to predict whether a company will face financial distress (Reddy, 2012 ; Sun, Li, Huang, & He, 2014). Lin (2009) defined financial distress as inability to meet the financial obligations as they mature. Ross, Westerfield, and Jaffe (1999) defined distress in a very comprehensive manner as one of the following four conditions : (a) business failure, that is, when a liquidated company cannot pay its unpaid debt ; (b) legal bankruptcy, that is, when an application is made to the court for a declaration of bankruptcy by a company or its creditors ; (c) technical bankruptcy, that is, the company fails to fulfill the contract to repay principal and interest; and (d) accounting bankruptcy, that is, the company's book value of the net assets are negative. However, in this study, financial distress is assumed to be compulsory delisting of large cap companies from the Bombay Stock Exchange (BSE), India due to any of these reasons mentioned above. Corporate financial distress deserves apt attention due to the severe consequences it has on the firm itself, on various other stakeholders, including

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creditors, lenders, business partners, and the economy in which it operates. The incidence of important failures, such as WorldCom and Enron, has made the regulators and policy makers worldwide more cautious of the risks involved in corporate failures. Hence, forecasting of corporate financial distress is important and would help protect the interests of a business, its investors, and various other stakeholders, including the economy involved.

Relevance of the Study

A sizeable amount of empirical work spread across 1960s to 2010s has been carried out to develop valid and accurate models to predict corporate financial distress prior to the incident (Altman, 1968 ; Beaver,1966 ; Campbell, Hilscher, & Szilagyi, 2008). Most of these studies focused on constructing the models, finding their predictive ability, and comparing the performance of different models employing the data mostly related to anglo-Saxon economies. In this backdrop, what formed the motivation for the study were the numerous reports on increasing indebtedness of Indian companies at an aggregate level, hinting at an increase of corporate leverage. The recent financial stability report of RBI (Reserve Bank of India, 2014) identified high and increasing leverage and low profitability of Indian corporate sector as a high risk area.

These circumstantial developments brought in enough curiosity to predict corporate financial distress in India. Consequently, this led to the problem of choice of an appropriate model to predict corporate financial distress in India, and the study is designed to address this choice dilemma. According to Chandra (2008) it is not the statistical complexity of the model, rather the ability of the model to produce superior performance, which should be the criteria to evaluate a quantitative model. Thus, the study in its search for a better model compares the accuracy levels of the two most popular models to predict financial distress of widely held large-cap companies in India. The prediction of corporate financial distress can be of great help not only to the company itself, but also to its stakeholders, including the investors, market regulators, and the economy by either aborting the distress and distress led bankruptcy or at least by limiting the severity of the consequences of the distress.

Review of Literature

During the past eight decades, there was extensive development of different financial distress predictive models, which can be broadly classified into two categories, that is, parametric models (accounting based and market based models) and non - parametric models (artificial neural networks, hazard models, fuzzy models, genetic algorithms, and hybrid models) (Fejer - Kiraly, 2015). The present study primarily discusses the accounting based and market based parametric models.

Some studies during 1930s and after predominantly used univariate models and concluded that a bankrupt company's ratio measurements were significantly different from the healthy ones and ratio analysis could be effective in predicting failure (Beaver, 1966). Beaver (1966) chose a sample of failed firms and compared patterns of 29 ratios in the 5 years preceding bankruptcy with a control group of firms that did not fail and concluded that the cash flow to debt ratio was the single best predictor of the bankruptcy of a firm. In general, ratios that measured profitability, liquidity, and solvency prevailed as the most significant indicators, though their pecking order of importance could not be established since almost each study cited a different ratio as the most effective toward this end. This created confusion and posed a bottleneck for generalization of the theory. The quest for identification of order of importance of ratios later gave way to the usage of multivariate analysis for the purpose (Altman, 1968 ; Ohlson, 1980). These recent studies, with the help of statistical techniques, could determine the ratios which were more important than the others and accordingly assigned weights to these ratios in their pursuit for predicting bankruptcies.

One of the most popular models for predicting financial distress has been given by Altman (1968) by using the multiple discriminant analysis (MDA), where a multivariate statistical technique was used to develop the predictive model. The model gave five financial ratios for predicting the default rates up to 3 years before the actual default happens. Altman developed his model by using data of the firms that filed a petition under Chapter X of the National Bankruptcy Act from 1946 to 1965 (Ahuja & Singhal, 2014). However, the Altman model has been criticized as it assumed that the independent variables follow multivariate normal distribution and equal covariance matrix (Nam & Jinn, 2000) and the MDA can be optimal only if the normality conditions are satisfied (Karels & Prakash, 1987). These limitations of discriminant analysis have shaped the development of logit models.

Ohlson (1980) was among the first to use logit analysis to develop a bankruptcy prediction model to assess the probability of corporate financial distress. Ohlson took assumptions that were different from Altman's model. The model was developed by analyzing 2163 publicly traded companies (105 defaulted and 2058 non-defaulted) for the period of 1970 to 1976. Considering both company level and market level variables, Ohlson developed a model to find out the *O* - score for each company, which was again transformed into a probability *(P)* using a logistic transformation whereby $P > 0.98$ indicated that a company was at risk of financial distress and $P < 0.98$ indicated that a company was financially safe.

When it came to the power of these bankruptcy prediction models in right predicting the financial distress, academicians and practitioners have always differed in their opinion due to the sensitivity of the time periods and financial conditions. Reverberating similar concerns, Pongsatat, Ramage, and Lawrence (2004) in their study compared the predictive capabilities of Ohlson and Altman's models and concluded that the prediction accuracy of Altman model and Ohlson model did not differ significantly for both large and small asset firms.

In addition to the above, notably most studies related to the assessment of corporate financial health in the Asia - Pacific region including Hong Kong and Singapore (Foo, 2015), China (Wang & Campbell, 2010), India (Chander & Chandel, 2011; Pradhan, 2014), and Malaysia (Thai, Goh, Teh, Wong, & Ong, 2014) used Altman's model, which leaves us with the perception that they would have considered the Altman model to be the best one to serve the purpose. This guides us towards the fact that the two most important and mostly used parametric bankruptcy predictive models happen to be the accounting based '*Z* score model' and the market based '*O* score model' developed by Altman (1968) and Ohlson (1980), respectively (Grice & Dugan, 2001; Raiyani & Bhatasna, 2011).

Objectives of the Study

The present study primarily aims at identifying a parametric model that can right predict financial distress of widely held large-cap companies in India. Thus, an attempt is made to determine the accuracy levels of the two most popular parametric models, that is, Altman model and Ohlson model (Grice & Dugan, 2001) in predicting financial distress of widely held large-cap companies in India, with the aim to compare the level of accuracies of both the models.

Methodology

(1) Sampling Procedure : The companies defined as financially distressed are those BSE 100 companies which were delisted from BSE during this period due to business failure, legal bankruptcy, technical bankruptcy, and accounting bankruptcy (Ross et al., 1999) as defined in the introduction section. This group totalled 15 companies from 15 different industries, which were not able to pay their principals and interests and could not fulfill their

financial obligations. These companies may or may not have applied for the legal status of bankruptcy as they could have either resorted to out of court settlements or acquisitions by other companies or could have received huge bailouts from the governments to prevent themselves from going bankrupt.

The paired control sample of financially non-distressed companies included two companies both belonging to the same industry as each of the distressed companies belonged to, but with sound financial health. Hence, this group totalled 30 companies, that is, two financially non - distressed companies for each of the 15 financially distressed companies. This resulted in a total sample of 45 companies comprising of 15 financially distressed and 30 financially non - distressed companies belonging to 15 industry sectors, including airline, IT, telecom, automobile, media and entertainment, castings, consumer electronics, fertilizers, cables, edible oils, textile, etc. but excluding banks and financial institutions. The details of companies, industries, and sample groups are given in the Appendix.

(2) Methodology, Data Sources, and Analysis : The Altman *Z* score and Ohlson *O* score were calculated for all the sample companies based on the financial data (of the respective companies) relating to preceding 2 years to the default of financially distressed companies. The Altman model defined companies as safe if their *Z* score was above 2.67, while companies with a *Z* score below 1.81 were defined as financially distressed, and companies with a *Z* score above 1.81 but below 2.67 as grey companies (i.e. companies that may or may not face financial distress). Accordingly, for the purpose of the study, the companies with a *Z* score above 2.67 were classified as non-distressed companies, and with a conservative approach, all the remaining companies with a *Z* score below 2.67 were classified as distressed companies.

Similarly, as per Ohlson's *O* score, all the companies were divided into two categories. The companies having a less than 98% of probability of default were defined as non-distressed companies and the companies having more than 98% probability of default were defined as distressed companies.

For this purpose, the relevant financial data were taken from the Prowess database. Some data related to different economic indicators such as gross national product (GNP) etc. were sourced from Reserve Bank of India (RBI) website.

Finally, the Altman model and Ohlson model predicted the financial status of the sample companies, which were compared with their actual financial status to ascertain the rate of prediction accuracies and errors of both the models. Furthermore, the rate of prediction accuracies and errors of both the models were also compared with each other to identify the model with superior predictive accuracy. Person's chi - square test was performed to find out statistical significance of variations of rate of prediction accuracies between the two models. The null hypotheses that were put to statistical test of significance are as follows :

- **H01 :** There is no significant difference between the rate of prediction accuracy of Altman model and Ohlson model in predicting the overall financial health (both distress/ soundness) of widely held large cap companies in India.
- **H02 :** There is no significant difference between the rate of prediction accuracy of Altman model and Ohlson model in predicting the financial distress for widely held large cap companies in India.
- **H03 :** There is no significant difference between the rate of prediction accuracy of Altman model and Ohlson model in predicting financial soundness (non - distress) for widely held large cap companies in India.

All the hypotheses were tested using SPSS software.

(3) Model Description : Altman's *Z* score and Ohlson's *O* score were calculated with the following definition as

suggested by the originators of these models, that is, Altman (1968) and Ohlson (1980), respectively.

$$Z\text{ score} = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + .999T_5 \quad (1)$$

$$Z\text{ Score*} = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 \quad (2)$$

where,

Z Score = Altman score for widely held manufacturing companies,
Z Score* = Altman score for widely held non-manufacturing companies,
T_1 = Working capital / total assets,
T_2 = Retained earnings / total assets,
T_3 = Earnings before interest and taxes / total assets,
T_4 = Market value of equity / total ,
T_5 = Sales/ total assets.

and

$$O\text{ score} = -1.32 - 0.407*AS + 6.03*LM - 1.43*WCM + 0.757*ICR - 2.37*ROA - 1.83*FTDR + 0.285*DCLM - 1.72*DCRA - 0.521*CINI \quad (3)$$

where,

O Score = Ohlson score for widely held companies,
AS (adjusted size) = ln (Total assets/GNP price - level index),
GNP price - level index = (Nominal GNP/real GNP)*100,
LM (Leverage measure) = Total liabilities/total assets,
WCM (Working capital measure) = Working capital/total assets,
ICR (Inverse current ratio) = Current liabilities/current assets,
ROA (Return on assets) = Net income/total assets,
FTDR (Funds to debt ratio) = Funds from operations/total liabilities,
Funds from operations = pretax income + depreciation,
DCLM (Discontinuity correction for leverage measure) = a dummy variable kept at 1 if total liabilities exceed total assets; else kept zero,
DCRA (Discontinuity correction for return on assets) = a dummy variable kept at 1 if income is negative; else kept zero,
CINI (Change in net income) = (Net income $_{(t)}$ - Net income $_{(t-1)}$)/(Net income$_{(t)}$ + Net income$_{(t-1)}$)

The O-score is transformed into a probability using a logistic transformation whereby $p > 0.98$ indicates company at risk and $p < 0.98$ indicates that the company is safe .

$$\text{Probability of Failure} = P = \exp.(O\text{ - score})/(1 + \exp.(O\text{ - score})$$

Analysis and Results

(1) Prediction Accuracy of the Altman Model : The analysis of the results shows that the Altman *Z* score could rightly predict the financial condition for the following accounting year for as many as 39 companies out of a total sample of 45 companies (Table 1). This means an impressive rate of 86.6% right prediction. However, a stratified analysis of financially distressed and non-distressed companies reveals that this model in 26.7% cases wrongly predicts a financially distressed company to remain financially sound (i.e. type I error). Similarly, in 6.7% of the cases, this model erroneously predicts a financially sound company to be approaching financial distress (i.e. type II error). This suggests that in as many as 26.7% of the cases, the Altman model misses to rightly predict that the companies would face financial distress and in a mere 6.7% of the cases, the model misses to rightly predict that the companies would remain financially sound.

(2) Prediction Accuracy of the Ohlson Model : The analysis shows that the Ohlson *O* - score could rightly predict the financial condition for the following accounting year for 33 companies out of a total sample of 45 companies (Table 2). This means a rate of 73.3% right predictions. However, a similar stratified analysis of financially distressed and non-distressed companies reveals that this model is subject to relatively lower levels of type I error at 13.4% than type II error of 34.4%. This means that in only 13.4% of the cases, the Ohlson model misses to rightly predict that the companies would face financial distress and in as many as 34.4% of the cases, the model misses to rightly predict that the companies would remain financially sound.

(3) Comparative Analysis of Prediction Accuracies of Altman Model vs. Ohlson Model in Predicting Financial Health of the Companies : The analysis brings out that the Altman model is able to right predict the financial

Table 1. Prediction Accuracy of Altman Model

Actual↓ / Prediction→	Predicted to be Financially :		Rate of Right Prediction	Rate of Error
	Non Distressed	Distressed		
Financially distressed companies				
(Total 15 companies , 100%)	4	11	11/15 = 73.3%	4/15 = 26.7%*
Financially non - distressed companies				
(Total 30 companies , 100%)	28	2	28/30 = 93.3%	2/30 = 6.7%#
	Overall Rate		39/45 = 86.6%	6/45 = 13.4%

Note: * Type I error ; # Type II error

Table 2. Prediction Accuracy of Ohlson Model

Actual↓ / Prediction→	Predicted to be Financially :		Rate of Right Prediction	Rate of Error
	Non Distressed	Distressed		
Financially distressed companies				
(Total 15 companies , 100%)	2	13	13/15 = 86.6 %	2/15 = 13.4%*
Financially non - distressed companies				
(Total 30 companies , 100%)	20	10	20/30 = 66.6%	10/30 = 33.4% #
	Overall Rate of		33/45 = 73.3%	12/45 = 26.7%

Note: * Type I error ; #Type II error

Figure 1. Relative Ability of Both the Models in Predicting Financial Health

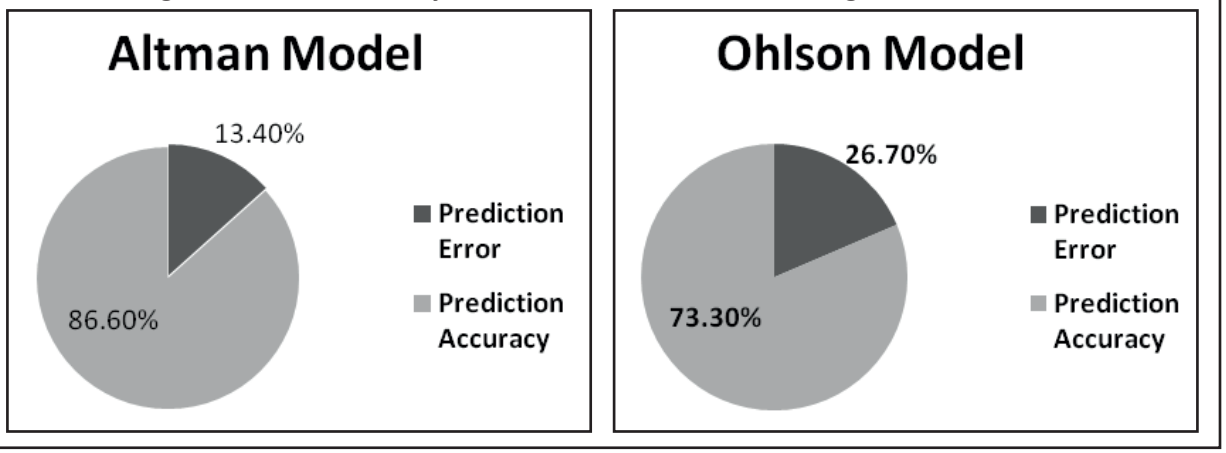
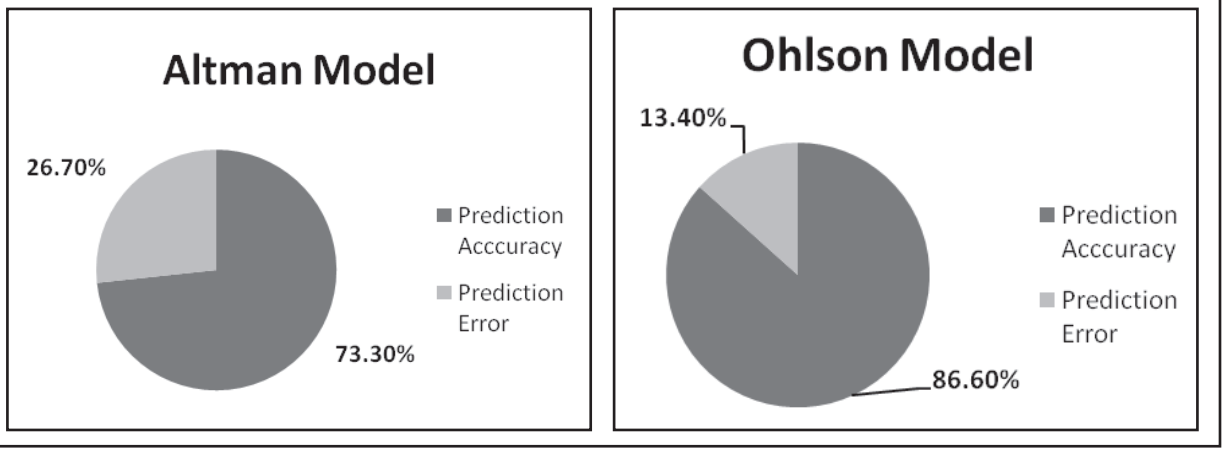


Figure 2. Relative Ability of Both the Models in Predicting Financial Distress



health (both financial distress and non-distress) of 86.6% of the sample companies against 73.3% right prediction of the financial health of the sample companies by the Ohlson model (Figure 1). This implies that the Altman model is rather better in predicting the financial health of the companies.

(4) Comparative Analysis of Prediction Accuracies of Altman Model vs. Ohlson Model in Predicting the Financial Distress for Companies : It is observed that the overall prediction accuracy in predicting the financial health is higher in case of the Altman model as compared to the Ohlson model. However, what is more important is the right prediction of financial distress rather than right prediction of the financial soundness of a company. The Figure 2 presents the relative ability of both the models in predicting financial distress of a company.

The analysis reveals that the Ohlson model has a prediction accuracy of 86.6% against a prediction accuracy of 73.3% of the Altman model in predicting the financial distress for the companies. This suggests that with reference to predicting financial distress for a company, the Ohlson model scores better than the Altman model.

(5) Comparative Analysis of Prediction Accuracies for Financially Non - Distressed Companies : When only financially non - distressed companies were considered (Figure 3), it is observed that the prediction accuracy is

Figure 3. Relative Ability of Both the Models in Predicting Financial Soundness (Non-Distress)

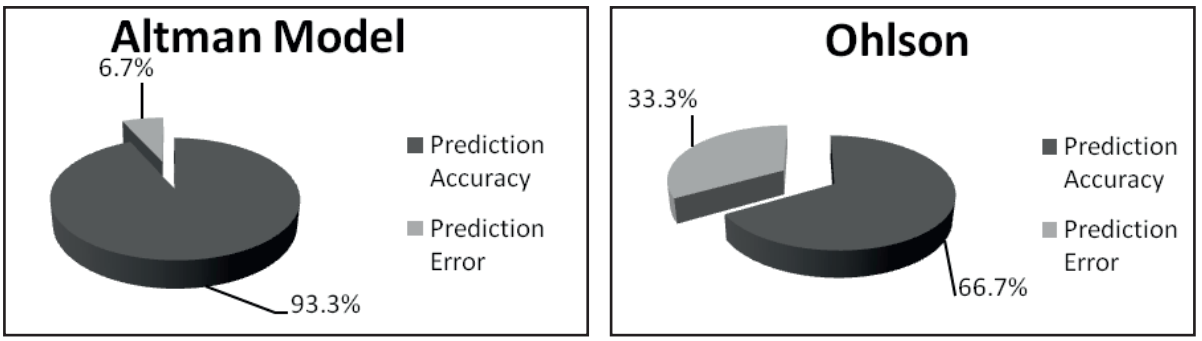
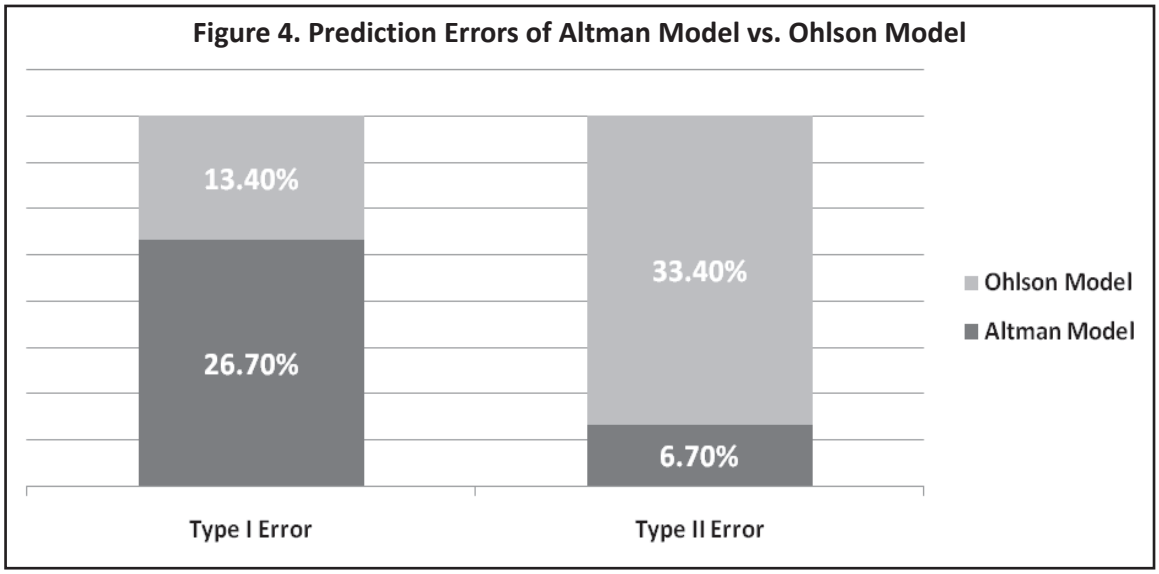


Figure 4. Prediction Errors of Altman Model vs. Ohlson Model



higher in case of the Altman model (93.3%) as compared to the Ohlson model (66.7%). Thus, the Altman model shows greater prediction accuracy in predicting whether the companies will remain financially sound or not.

(6) Comparative Analysis of Prediction Errors of Altman Model vs. Ohlson Model : A prima facie observation reveals that the Altman model has lesser overall error rate of 13.4% in predicting financial performance of the sample companies, while the overall error rate of Ohlson model is higher at 26.7%. The Figure 4 presents a dissection of error rates into type I and type II errors of both the models in predicting financial performance of the companies. A type I error means a financially distressed company is predicted to remain financially sound ; whereas, a type II error means that a financially sound company is predicted as approaching financial distress (Altman, 1968).

Accordingly, a closer examination unearths that though the overall error rate is lesser in case of the Altman model, it has a very high type I error rate at 26.7% against a modest type I error rate of 13.4% in case of the Ohlson model. Meanwhile, type II error rate is very high in case of Ohlson model at 33.4% against a rather negligible 6.7% type II error rate of the Altman model. It is sensible to understand here that predicting a financially sound company to be approaching financial distress (type II error) is probably a mistake of lesser order and excusable ; whereas, predicting a financially distressed company to remain financially sound (type I error) can prove to be a fatal

mistake. Moreover, it can be recalled that it is financial distress that may lead to corporate failure and a model that misses more often in predicting financial distress for the widely held large cap companies (type I error) cannot be considered reliable. By this logic, it appears that the Ohlson model scores over the Altman model, but any conclusion cannot be drawn unless it is checked that the findings are statistically significant or have erupted by pure chance. The study advances in the same direction in the following section.

(7) Difference Between Prediction Accuracies of Altman Model vs. Ohlson Model - Statistical Test of Significance : The SPSS results of chi - square test bring out the significance of Pearson's chi - square at 0.114, which is more than 0.05 (see Table 3), which suggests acceptance of the null hypothesis (H01) that there is no significant difference between the overall prediction accuracy of Altman model and Ohlson model. This helps us to conclude that both the Altman model and Ohlson model are more or less equally capable in predicting the overall financial health of widely held large cap companies in India.

When the SPSS results of the chi - square test for analysis of difference of prediction accuracies of both the models for financially distressed companies are referred to (Table 4), it reveals a significance value of 0.361, which is more than 0.05. This leads to the acceptance of the null hypothesis (H02) that there is no significant difference between the prediction accuracies of the Altman model and the Ohlson model in predicting financial distress for widely held large cap companies in India.

The Table 5 presents the SPSS output for Pearson's chi- square test to identify any significant difference between prediction accuracies of both the models in predicting financial soundness (financial non-distress) for widely held large cap companies in India. It can be seen in the Table 5 that the significance level for Pearson's chi- square is 0.010, which is less than 0.05. This leads to the rejection of the null hypothesis (H03) and acceptance of the alternate hypothesis and hence helps in concluding that the prediction accuracies of both the models are significantly different in predicting the financial soundness (non - distress) for the widely held large cap companies in India.

Table 3. Difference of Prediction Accuracies Between Altman Model and Ohlson Model in Predicting Financial Health : Chi-Square Test Results

	Value	*df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.500	1	.114		
Continuity Correction	1.736	1	.188		
Likelihood Ratio	2.539	1	.111		
Fisher's Exact Test				.187	.093
N of Valid Cases	90				

Table 4. Difference of Prediction Accuracies Between Altman Model and Ohlson Model in Predicting Financial Distress : Chi Square Test Results

	Value	*df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.833	1	.361		
Continuity Correction	.208	1	.648		
Likelihood Ratio	.846	1	.358		
Fisher's Exact Test				.651	.326
N of Valid Cases	30				

Table 5. Difference of Prediction Accuracies Between Altman Model and Ohlson Model in Predicting Financial Soundness : Chi Square Test Results

	Value	*df*	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.667	1	.010		
Continuity Correction	5.104	1	.024		
Likelihood Ratio	7.162	1	.007		
Fisher's Exact Test				.021	.011
N of Valid Cases	60				

Discussion and Conclusion

The study brings out quite interesting results favouring both the Altman model and the Ohlson model, of course with different preconditions. Though the overall rate of prediction accuracy of financial health of widely held large cap companies is higher in case of the Altman model (86.6%) rather than that of the Ohlson model (73.3%), the Pearson chi - square test reveals that this difference is not statistically significant even at the 0.05 level. However, when the rate of accuracy in prediction of only financial distress of widely held large cap companies in India is considered, it is observed that the Ohlson model demonstrates a higher rate of accuracy (86.6%) than the Altman model (73.3%). However, again, the Pearson chi - square test unearths that even this difference is statistically insignificant at the 0.05 level. Interestingly, when the rate of accuracy in prediction of only financial soundness (non - distress) of widely held large cap companies in India is considered, it is observed that the prediction accuracy is higher in case of the Altman model (93.3%) as compared to the Ohlson model (66.7%) in predicting that the companies will remain financially sound, and moreover, this difference is found to be statistically significant with Pearson's chi-square significance at the 0.01 level.

It may be recalled at this point that the objective of the study is to identify a parametric model that can rightly predict the financial distress for widely held large cap companies in India. It is only the auxiliary analysis that has identified that both the models are more or less equally capable in predicting the overall financial health of widely held large cap companies in India, and that the Altman model is superior in identifying whether the widely held large cap companies in India will remain financially sound. However, the fact that closes both the study and its primary objective is that though both the Altman model and the Ohlson model have high-accuracy levels, they hardly vary in their respective prediction accuracies in predicting financial distress for widely held large cap companies in India.

Research Implications

The study unearths the fact that despite being developed using different techniques, logic, and assumptions, both - the accounting based parametric model, that is, the Altman model and the market-based parametric model, that is, the Ohlson model have high accuracy and are equally capable of predicting financial distress for widely held large cap companies in India. This finding is in line with the findings of Pongsatat et al. (2004) about the prediction accuracies of Altman model and Ohlson model. However, their study considered both large and small asset Thai firms, while in the current study, the scope is limited to the widely held large cap companies in India. Thus, to predict financial distress of widely held large cap companies in India, either model can be used. But given the data requirement for applying the models, the Altman model can be a better choice as it requires all reported accounting data, which is easier to obtain, than the market data as required by the Ohlson model. Furthermore, the study

reveals that the Altman model is rather better in predicting financial soundness (non - distress) for widely held large cap companies in India. Hence, if a similar company is predicted to remain financially sound by the Ohlson model, then a cross check with the Altman model can double assure the prediction.

Limitations of the Study and Scope for Further Research

By research design, the study concentrated only on widely held large cap companies in India. Therefore, the generalization of the findings to other types of firms may not be possible. Similarly, the results cannot be claimed to be applicable to widely held large cap companies belonging to other economies rather than India. Absence of a corporate bankruptcy or financial distress related database in India also acted as a limitation for the sample selection for financially distressed companies.

The present study attempted to explore a model that can better predict financial distress for widely held large cap companies in India. In the future, the same analysis can be extended to different economies, for example, for widely held large cap companies in emerging economies or for widely held large cap companies worldwide. Furthermore, the study can also be conducted for mid cap and small cap segment companies in India vis-a-vis other economies. The empirical results of such studies shall bring out whether the findings of the present study are undisputable and hold good for different economies and different corporate (firm) segments.

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Appendix. Details of the Sample Companies

Sl. No.	Year of Default	Name of the Company	Industry	Sample Group
1	2003	Premier Ltd	Engineering	Financially distressed
2	2003	Om Metals Infraprojects Ltd.	Engineering	Financially non distressed
3	2003	LG Balakrishnan & Bros. Ltd.	Engineering	Financially non distressed
4	2003	Surya Agroils Ltd.	Edible Oils	Financially distressed
5	2003	Ruchi Soya Industries Ltd.	Edible Oils	Financially non distressed
6	2003	AVT Natural Products Ltd.	Edible Oils	Financially non distressed
7	2004	HMT Bearings ltd	Auto- tractors	Financially distressed
8	2004	VST Tillers Tractors Ltd.	Auto- tractors	Financially non distressed
9	2004	Escorts Ltd.	Auto- tractors	Financially non distressed
10	2005	Optel telecom ltd	Cables & Telecom	Financially distressed
11	2005	Finolex Cables Ltd.	Cables & Telecom	Financially non distressed
12	2005	Sterlite Technologies Ltd.	Cables & Telecom	Financially non distressed
13	2005	Bharat Commerce and Industries ltd	Textile	Financially distressed
14	2005	Banswara Syntex Ltd.	Textile	Financially non distressed
15	2005	Hind Syntex Ltd.	Textile	Financially non distressed
16	2007	ITI ltd	Telecom & Equipment	Financially distressed
17	2007	Astra Microwave Products Ltd.	Telecom & Equipment	Financially non distressed
18	2007	Himachal Futuristic Communications Ltd.	Telecom & Equipment	Financially non distressed
19	2007	Mig weld machines Ltd.	Electrodes/Graphite	Financially distressed
20	2007	Ador Welding Ltd.	Electrodes/Graphite	Financially non distressed
21	2007	Panasonic Carbon India Co. Ltd.	Electrodes/Graphite	Financially non distressed
22	2009	Satyam Computer Services Ltd.	Information Technology	Financially distressed
23	2009	HCL Technologies Ltd.	Information Technology	Financially non distressed
24	2009	Wipro Ltd.	Information Technology	Financially non distressed
25	2011	Deccan Chronicle Holdings Ltd.	Media & Entertainment	Financially distressed
26	2011	Tips Industries	Media & Entertainment	Financially non distressed
27	2011	Zee Media Corporation Ltd.	Media & Entertainment	Financially non distressed
28	2011	Hindustan Photofilms Mfg. Co. Ltd.	Consumer gold and Electronic	Financially distressed
29	2011	Videocon Industries Ltd.	Consumer gold and Electronic	Financially non distressed
30	2011	PG Electroplast Ltd.	Consumer gold and Electronic	Financially non distressed
31	2012	Kingfisher Airlines Ltd.	Airline	Financially distressed
32	2012	Jet Airways (India) Ltd.	Airline	Financially non distressed
33	2012	Container Corp.of India Ltd.	Airline	Financially non distressed
34	2012	Scooters India Ltd.	Automobile	Financially distressed
35	2012	Mahindra Scooters Ltd.	Automobile	Financially non distressed
36	2012	TVS Motors Company Ltd.	Automobile	Financially non distressed
37	2012	Electrosteel Castings ltd.	Castings and Forgings	Financially distressed
38	2012	Mahindra CIE Automotive Ltd.	Castings and Forgings	Financially non distressed
39	2012	Jayaswal Neco Industries Ltd.	Castings and Forgings	Financially non distressed
40	2012	Fertilizers and chemicals Ltd.	Fertilizer sector	Financially distressed
41	2012	Rashtriya Chemicals & Fertilizers Ltd.	Fertilizer sector	Financially non distressed
42	2012	National Fertilizers Ltd.	Fertilizer sector	Financially non distressed
43	2013	Hindustan Cables Ltd.	Telecom Equipment	Financially distressed
44	2013	Honeywell Automation India Ltd.	Telecom Equipment	Financially non distressed
45	2013	Bharti Infratel Ltd.	Telecom Equipment	Financially non distressed

About the Author

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