

The Nature of Companies who Filed Chapter 22 and  
33 – Analyzing Post Emergence Success through the  
Distress Predictor Model

By

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## **Predicting Post Emergence Success**

While many financial models have been designed to assess default probability, namely the Altman Z-Score and Moody's KMV, few scholars dedicate their attention to post emergence success. From studying Chapter 22 and 33 companies, the author searches for a trend indicative of the intrinsic difference between successful and unsuccessful bankruptcies. Using the Altman Z' Score as a foundation, the paper studies three time observations, one year before bankruptcy, the period of emergence, and one year after emergence. The results conclude with the emergence and post emergence data as critical in determining success. For a firm to achieve a high post-emergence Z' Score, the author emphasizes the role of the Reorganization Plan in restructuring the debt level and company structure.

## The Nature of Companies Who File Chapter 22 and 33:

### Analyzing Post Emergence Success through the Distress Predictor Model

#### ***Introduction***

The success of a bankruptcy can be defined as preservation of the insolvent firm's value for the overall claimholders. Bankruptcy is a costly process, with direct and indirect costs that in the case of Enron, exceeded \$1 billion in advisory fees. With the automatic stay clause, the process could be prolonged and the senior claims deteriorated through Debtor-in-Possession subordination and forgone interests. Although the 2005 Bankruptcy Act arguably favored creditors through limiting the period of exclusivity to 18 months, the legislation mainly focused on expediting the bankruptcy process. As a result, firms that should have liquidated could still potentially emerge, most of which would eventually become candidates for Chapter 22 and Chapter 33 or file for liquidation.

From 1984 to 2004, there have been 157 occurrences of Chapter 22s and 7 occurrences of Chapter 33s. To assess the effectiveness of reorganization, this paper studies Chapter 11 companies who refiled Chapter 22 and Chapter 33 from 1990 to 2002. Analyzing their financial conditions versus the population of successful emergences in the same time period based on the Altman  $Z''$ -Scores, the author searches for a trend that may be indicative of serial filers in the bankruptcy process. Theoretically, Chapter 22 and 33 filers should exhibit lower  $Z''$ -Score characteristics than successful emergences, and this paper examines whether this proposition would hold true one year before filing, the quarter of emergence and one year after emergence. Implications of these results would provide a better understanding of the bankruptcy process and whether the traditional bankruptcy prediction model would be applicable to forecasting post emergence success.

### ***Reorganization Theory***

The reorganization process is designed to offer the insolvent firm an alternative to liquidation based on the estimated enterprise value. The bankruptcy judge should bestow automatic stay protection with Chapter 11 when the value of the enterprise as a going concern exceeds its liquidation value. Otherwise, the insolvent firm should file for Chapter 7 and distribute cash through the waterfall hierarchy of the various claimholders. However, in discounting the future cash flows of the reorganized company, financial advisers are subject to valuation biases based on their clients' positions. An investment bank representing the senior bondholders would model for a low valuation in favor of liquidation. On the contrary, banks employed by junior claimholders and the management team would opt for a higher valuation to maximize their stake through reorganization. Given this inherent subjectivity of the appraisal process, oftentimes a Chapter 7 candidate would reorganize, and eventually either liquidate or refile as a Chapter 22. A potentially successful firm could also be granted liquidation, precluding junior holders from their deserved claims. Both scenarios depict a structural imperfection within the current bankruptcy process as the theoretically optimal value of the insolvent company is not preserved due to misclassification of Chapter 7 and Chapter 11 candidates.

### ***Defining a Successful Bankruptcy***

Due to the subjectivity in the appraisal process, this paper tests whether a standardized indicator can be used to determine post emergence success, with the Z'' Score as the model of choice. Before analyzing the array of companies in the bankruptcy universe – Chapter 22, Chapter 33, Liquidation and Successful Emergence – first, the four scenarios must be categorized relative to their “success”. Although many elements

may constitute a successful bankruptcy, for the purpose of this report, success denotes the prolonged time period before the second filing or the financial privilege of not having to file again. Consequently, a firm that emerges and never has to file again represents the ultimate success of the bankruptcy process. This type of successful emergence embodies the theory of reorganization, allowing firms to re-establish a competitive advantage and return higher value to shareholders than the liquidation scenario. Candidates that eventually liquidate or file for Chapter 22 or 33 would be less successful. Having to file only twice instead of three times, a Chapter 22 firm experiences a higher level of success than Chapter 33. Furthermore, it is unfair to penalize a Chapter 22 that refiles in a longer time period than a Chapter 22 that refiles shortly after emergence. Therefore, the spectrum of success also depends on the number of years between emergence and the second bankruptcy filing. However, with a liquidation case, the distinction is less clear. Theoretically, a post-Chapter 11 liquidation should possess the worst financial health and exhibit the lowest Z" Scores one year before filing since they never successfully reorganize. However, given that most liquidation cases never emerge, it is impossible to test whether these companies could have fared better than Chapter 22 and Chapter 33 if they were allowed to reorganize.

After categorizing the four bankruptcy scenarios as intrinsically different, the author proceeds to claim that their dissimilarity should be detectable in their financial filings, in order to constitute an assumption that there must be an impartial way to judge companies as opposed to the current subjective appraisal process by investment banks and other industry players. With the Z" Score as the methodology of choice, this paper proceeds to test whether the traditional bankruptcy prediction model would be indicative

of post-emergence success in addition to the original function of forecasting default probability.

### ***Developing the Distress Prediction Model: Prior Literature***

In the 1960's, two schools of statistical approaches emerged to quantify default probability – 1) the Univariate Model and 2) the Multivariate Model. In his 1966 classic, “Financial Ratios as Predictors of Failure”, William H. Beaver computed 30 financial ratios for a sample of 158 bankrupt firms and found that a number of indicators could discriminate between bankrupt and non-bankrupt samples five years prior to failure. As a univariate analysis, this empirical study recommended the cash flow to total debt ratio as the best single predictor of distress.

At the same time, Edward Altman published his research on the multivariate approach to predicting distress in 1968. Since ratio analysis presented in the univariate fashion can be susceptible to misinterpretation, Altman utilized Multiple Discriminant Analysis (MDA) to classify an observation into *priori* groupings dependent upon the observation's individual characteristics. From the original list of 22 variables, he selected five that altogether accurately classify 95% of the total sample of manufacturing companies correctly. The final discriminant function consists of the following:

$$Z = 1.2 X_1 + 1.4 X_2 + 3.3 X_3 + 0.6 X_4 + 1.0 X_5$$

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 Total Liabilities

$X_5$  = Sales/ Total Assets

Z = Overall Score

$Z > 2.99$	- “Safe” Zone
$1.8 < Z < 2.99$	- “Grey” Zone
$Z < 1.80$	- “Distress” Zone

The model was later revised to assign default probabilities according to the designated bond rating equivalents. As the original sample included only manufacturers, two adjustments were made to the Z-Score:  $Z'$  for private companies and  $Z''$  for non-manufacturers/ emerging markets. Both  $Z'$  and  $Z''$  exclude  $X_5$  due to the wide variation among industries and countries in asset turnover.

***The  $Z''$  Score***

Due to the large proportion of non-manufacturers in the author’s sample size, the  $Z''$  Score is used as an indicator of default probability. Although a model for non-manufacturers, the  $Z''$  can also be applied to manufacturers with considerable accuracy. Therefore, the  $Z''$  covers most of the firm types in the author’s sample, except financial institutions, an industry which experiences high leverage and working capital needs. To conveniently assign bond rating equivalents to the calculated credit score, the author utilized a variation of the  $Z''$  model where a +3.25 constant is added to standardize the scores based on the  $Z''$  of 0 as equivalent to a D (defaulted) rating bond:

$$Z'' = 3.25 + 6.56 X_1 + 3.26 X_2 + 6.72 X_3 + 1.05 X_4$$

Table I in the next page illustrates the bond rating equivalents based on the average  $Z''$  Score. Table II presents the corresponding default probabilities of each rating class. Through these two tables, default probabilities can be assigned to each company relative to the corresponding Bond Rating Equivalents derived from the  $Z''$  Scores.

Table I: Bond Rating Equivalents Based on the Z' Scores

US Equivalent Rating	Average EM Score	Sample Size
AAA	8.15	8
AA+	7.6	-
AA	7.3	18
AA-	7	15
A+	6.85	24
A	6.65	42
A-	6.4	38
BBB+	6.25	38
BBB	5.85	59
BBB-	5.65	52
BB+	5.25	34
BB	4.95	25
BB-	4.75	65
B+	4.5	78
B	4.15	115
B-	3.75	95
CCC+	3.2	23
CCC	2.5	10
CCC-	1.75	6
D	0	14

Table II: Bond Mortality Rate

		Years after issuance									
		1	2	3	4	5	6	7	8	9	10
AAA	Marginal	0.00%	0.00%	0.00%	0.00%	0.05%	0.01%	0.00%	0.00%	0.00%	0.00%
	Cumulative	0.00%	0.00%	0.00%	0.00%	0.05%	0.06%	0.06%	0.06%	0.06%	0.06%
AA	Marginal	0.00%	0.00%	0.31%	0.15%	0.02%	0.02%	0.00%	0.00%	0.05%	0.01%
	Cumulative	0.00%	0.00%	0.31%	0.47%	0.50%	0.52%	0.52%	0.52%	0.57%	0.58%
A	Marginal	0.01%	0.09%	0.03%	0.06%	0.05%	0.10%	0.05%	0.21%	0.10%	0.05%
	Cumulative	0.01%	0.10%	0.13%	0.21%	0.26%	0.36%	0.41%	0.62%	0.72%	0.77%
BBB	Marginal	0.34%	3.15%	1.36%	1.26%	0.75%	0.53%	0.19%	0.18%	0.14%	0.39%
	Cumulative	0.34%	3.48%	4.81%	6.01%	6.72%	7.26%	7.43%	7.60%	7.73%	8.09%
BB	Marginal	1.17%	2.46%	4.37%	2.30%	2.49%	1.25%	1.58%	1.10%	1.68%	3.50%
	Cumulative	1.17%	3.60%	7.81%	9.93%	12.18%	13.27%	14.65%	15.59%	17.00%	19.97%
B	Marginal	2.87%	6.83%	7.37%	8.51%	5.95%	4.30%	3.65%	2.30%	1.90%	0.84%
	Cumulative	2.87%	9.51%	16.18%	23.40%	27.95%	31.05%	33.57%	35.10%	36.33%	38.86%
CCC	Marginal	8.15%	15.47%	19.45%	12.00%	4.16%	9.36%	5.82%	5.65%	0.00%	4.77%
	Cumulative	8.15%	22.36%	37.47%	48.97%	46.70%	51.70%	54.56%	57.08%	57.08%	58.86%



A Chapter 11 candidate is expected to exhibit lower  $Z''$  Scores than healthy firms at least one or two years before filing, indicating higher likelihood of imminent bankruptcy.

Through this application, the  $Z''$  Score serves as one of the preeminent models in forecasting default probability for investors of risky securities. Another application is to forecast the upgrade and downgrade of ratings from S&P and Moody's as a fixed income investment strategy.

Although designed predominantly as a distress predictor, this paper holds that the  $Z''$  Score should be an accurate indicator of post-emergence success. Assuming that the characteristics of successful emergences are intrinsically different from those of Chapter 22 and 33, the  $Z''$  Score should signal the likelihood of success whether one year before filing, at the time of emergence or one year after emergence. The rest of the paper focuses on the empirical evidence in testing this assumption and exploring the implications of the results on the bankruptcy process.

### ***Data Collection***

This paper analyses the nature of each bankruptcy filing case based on three time observations:

- $T_1$  = One year before Chapter
- $T_2$  = The financial quarter of emergence
- $T_3$  = One year after emergence

Where:

$X_1, X_2$  and  $X_4$  are collected from the 10-K.  
 $X_3$  adjusts for the trailing twelve months EBIT

To test the data, the author collected a list of companies from the Bankruptcy Almanac between 1995 and 2003. The balance sheet and income statement information was provided by the Compustat database. Due to the fact that many of the companies have

been delisted as a private or a merged entity, a significant proportion of the total population was lost. As a result, 9 Chapter 33s, 40 Chapter 22s, 20 Successful Chapter 11 Emergence and 25 Liquidation were collected for the purpose of this research.

As companies in the sample filed Chapter 22 within the span of 1-11 years, it is illogical to penalize all the companies by classifying them together. Therefore, the author categorize the Chapter 22 observations as 1) Companies that filed 5 years after emergence and 2) Companies that filed more than 5 years after emergence. Companies that filed after 5 years are fundamentally healthier, and therefore should be exhibit higher Z' Scores.

### ***Pre-Chapter 11 Data***

The charts below exhibit the Z' Scores one year before bankruptcy filing for each company. The analysis includes 29 Chapter 22s that filed within 5 years, 9 Chapter 22s that filed more than 5 years, 9 Chapter 33s, 25 Liquidations and 20 Successful Emergences. For a Chapter 22 company, two observations are collected, one year before the first Chapter 11 filing and one year before the Chapter 22 filing. Accordingly, three observations are collected for Chapter 33, one year before the first, second and third filings. Along with the calculated Z' Scores, the tables tabulate the arithmetic average, median, and standard deviation of each Z' Score category. Based on the average, the author assigned a bond rating equivalent corresponding to the average EM Score in Table I. The results illustrate that the Z' Score is still a good predictor of bankruptcy, with the average of the 5 categories ranging from D to CCC+. Despite a few outliers such as Smith Corona, Brendle's, Casual Male Corp, Sabratek, JPS Textile and Krystal

Company, the mean Z” Scores still range from -0.8724 to 1.0852, indicating imminent bankruptcy.

**Chapter 22 that Filed in 5 Years**

Chapter	11	22
Penn Traffic	-4.5662	1.9046
All Star Gas	-0.8800	-8.0970
Prime Succession	0.2952	NA
Nucentrix Broadband	1.2550	0.9979
Pillowtex Corporation	4.9162	3.8039
Crown Books Corp	4.3743	NA
Archibild	0.7058	NA
Homeland Holdings	-2.8574	-2.9111
DecisionOne	-12.1248	NA
Payless Cashways	3.9601	5.3506
Planet Hollywood	1.5710	-6.7718
Trism	4.1157	-0.8161
Galey & Lord	5.4349	NA
Westmoreland	1.8797	-1.6869
Intelogic	-1.3364	-21.9404
Bradless Inc	4.1385	3.1743
Equalnet Corp	-2.4288	-12.5671
Ithaca Industries	-3.2108	5.6641
Lamonts Apparels	2.3971	2.2504
US Airways	1.9925	3.9582
Smith Corona	7.5778	-5.8029
Mcleod Usa	3.3291	-2.5958
Rymer Food	-0.1660	-5.3151
Brendle's Inc	7.1081	4.5148
Jamesway Corp	6.1016	6.9902
Levitz Furniture	1.8359	NA
Best Products	4.3944	6.0694
FAO	3.8105	-3.4954
Anacomp	-5.5453	-15.9905
American Banknote	NA	NA
Wherehouse Entert	-5.5230	0.9541
Average	1.0852	-1.7649
Median	1.8578	0.0690
Standard Deviation	4.3734	7.3489
Bond Ratings	CCC-	D

**Chapter 33**

Chapter	11	22	33
Braniff	-10.9302	0.7199	-4.4423
Grand Union	1.8883	-6.0152	0.7827
Memorex Telex	0.1042	1.3703	-1.3017
Salant Corp	3.0826	1.8796	1.1984
Trans World Airlines	-3.0692	3.0455	-0.1836
United Merchants	1.7961	0.4348	-2.8297
Samuel	0.2048	-0.0678	-7.1542
Anchor Glass	1.0755	1.7591	0.9354
Harvard Industries	1.8118	0.7691	0.4146
Average	-0.4485	0.4328	-1.3978
Median	1.0755	0.7691	-0.1836
Standard Deviation	4.2992	2.5880	2.8758
Bond Ratings	D	CCC-	D

**Chapter 22 that Filed after 5 Years**

Chapter	11	22
LTV Corp	2.7377	4.3909
Magellan Health	-1.7617	-2.4718
Sunshine	-7.5206	NM
Ames Dept. Stores	2.4231	2.8660
Casual Male Corp	6.8980	1.6924
Midway Airlines	-3.2213	3.4707
USG Corporation	-10.9402	4.9743
EaglePitcher	1.7531	1.4191
Paul Harris	1.7803	7.4840
Average	-0.8724	2.9782
Median	1.7531	3.1684
Standard Deviation	5.5910	2.9356
Bond Ratings	D	CCC+

### Liquidation

Chapter	11
Ernst Home Center	3.8310
Claridge Hotel	0.6787
DeVlieg	3.8883
Drypers	3.7890
Hechinger	3.9841
MicroAge	3.8080
Ponder Industries	0.4743
Sabratek	7.2779
Unitel	1.9119
BMJ Medical	1.0507
Brazos	5.6661
Cellnet	-0.6420
CHS Electronics	4.4890
Eagle Geophysical	4.3098
Genesis Direct	-6.8545
Healthcor	-8.5807
Metrotrans	5.4459
Neuromedical	-0.0612
Starter Corp	3.9936
Telegroup	5.7779
Kentech	-2.3915
Pluma	1.4182
Pacific Gateway Exchange	3.3576
Styling Technology	-0.2114
Calico Commerce	-24.0109
Average	0.8960
Median	3.3576
Standard Deviation	3.9427
Bond Ratings	CCC-

### Successful Emergence

Chapter	11
Elsinore Corp	-0.7538
El Paso Electronic	2.3921
Gantos Corporation	6.2244
Hexcel Corporation	1.7557
Emcor Group	-3.3123
Kash N' Karry	2.0597
Lone Star Industries	4.3682
Telemundo	-14.9454
Boonton Electronics	0.7543
Cherokee	1.6637
Emerson Radio	1.1996
Grant Geophysical	-8.0465
JPS Textile	6.0433
Krystal Company	10.3542
Singing Machine*	-39.1673
Stratosphere Corp	-5.0809
PhoneTel	-7.9698
Hvide Marine	-3.6859
Philip Services Corp	-6.6293
Teletrac	-0.8980
Average	-0.7635
Median	0.7543
Standard Deviation	6.0352
Bond Ratings	D

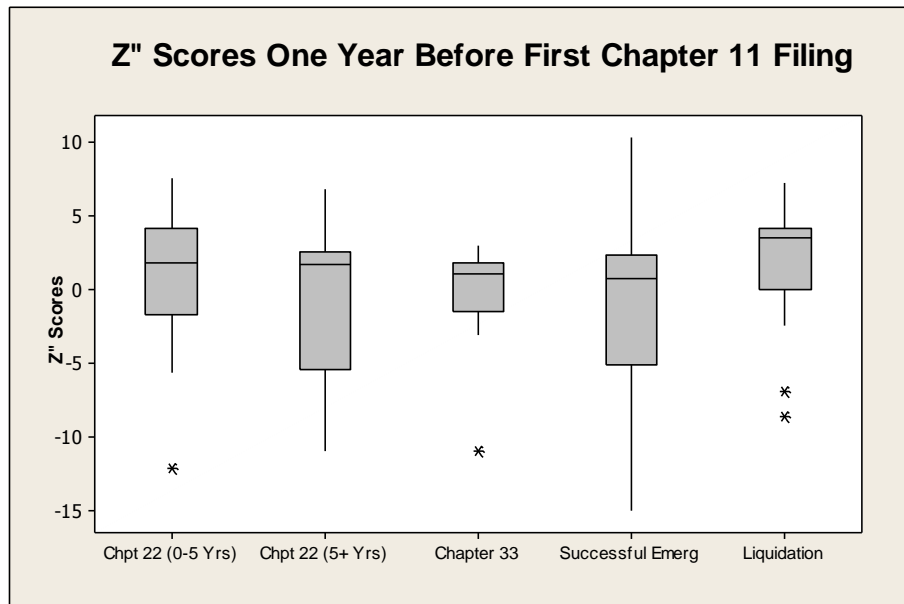
\* Excludes Singing Machine

NA denotes unavailable information. For sunshine, a Chapter 22 that filed after 5 years, NM represents omitted information. Sunshine's Retained Earnings for the second filing were at (766) while Equity was (36) due to an abnormally high proportion of capital surplus, resulting in a Z" Score of -111.

With the small sample nature of the observation, the author employed the Student's T-test method to test the significance in the different means obtained.

$$\frac{X_1 - X_2}{\sqrt{[(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2]}} \sqrt{\frac{n_1 n_2 (n_1 + n_2 - 2)}{n_1 + n_2}}$$

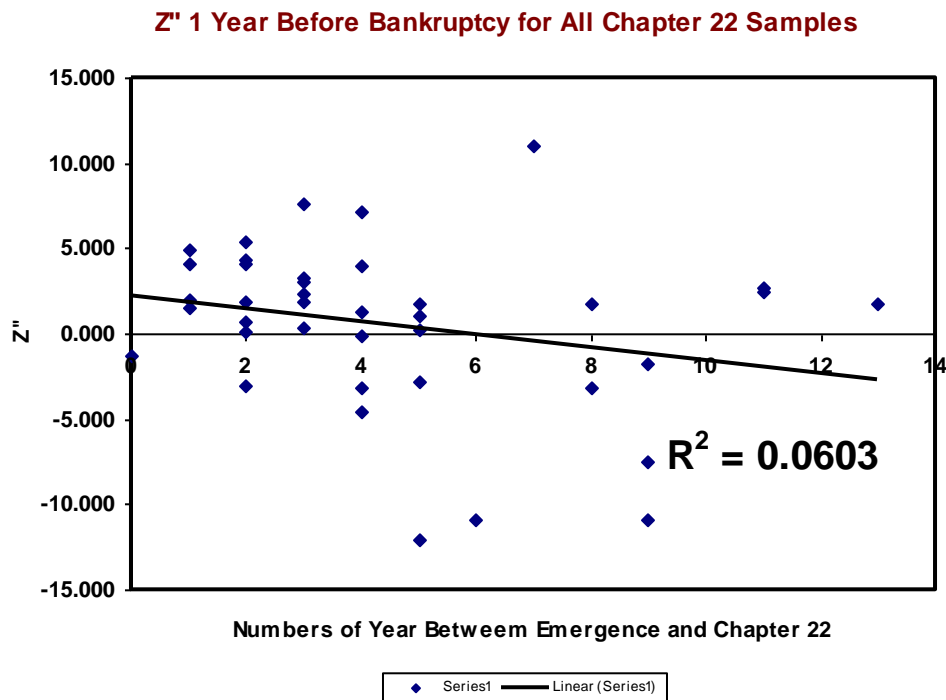
The test yields no statistical significance in any of the averages based on the degrees of freedom from the t-table. In addition, as illustrated graphically in the box plots below, the samples possess similar means and are significantly skewed towards the negative value at the time of observation one year before the first Chapter 11 filing.



Contrary to expectation, Successful Emergences exhibit the lowest Z'' average of -0.764 and a median of 0.754. The second lowest mean belongs to Chapter 22 that Filed after 5 Years with an average of -0.8724, followed by Chapter 33 at -0.4485. Liquidation is the second highest at 0.8960, and Chapter 22 is the highest at 1.0852. The results contradict with the logical assumption that liquidation would have the lowest Z'' Scores, followed by Chapter 33, Chapter 22 that Filed in 5 Years, Chapter 22 that Filed after 5 Years, and Successful Emergences. The unexpected results signify the difficulty in determining a bankruptcy's success from an observation one year prior to filing.

The author identified the Reorganization Plan as the missing element in this analysis. An emerged company is financially and structurally different from the original bankrupt entity, with a new debt to equity ratio, re-established relationship with the

suppliers and divestitures of unprofitable businesses as a few examples. Consequently, the author concluded that the pre-bankruptcy financial health of a company is indicative of only probability of distress, what the Altman Z” Score is originally designed for. Without considering the new structure of the distressed company, it is difficult to categorize the sample as successful or unsuccessful emergence. The scatter plot below illustrates the relationship between the number of years from the first filing to emergence for both Chapter 22 that filed in 5 years and longer than 5 years.



The low R-Squared proves that there is no relationship between Z” one year before emergence and the number of years it takes to re-file. In addition, the curve has a negative slope as opposed to a positive slope, contrary to expectation that a higher Z” Score would lead to a higher number of years.

The findings confirm the significance of the Reorganization Plan, that one cannot assess a bankruptcy’s success without considering the feasibility of the proposed

structure. One possible area of research beyond this paper is to study the  $Z''$  Score based on each firm's balance sheet in the Reorganization Plan to attest the correlation between the Reorganization Plan's  $Z''$  Score and post-emergence success. The author's results also reinforce the need for a subjective analysis in the bankruptcy process, despite the inherent biases. Because the bankrupt firm's structure is bound to change significantly after emergence, it is difficult to design an objective analysis to capture all the existing variables.

### ***Post Emergence Data***

Since the company emerges as a new entity, post emergence data should be more indicative of success than the pre-bankruptcy filing ratios. The following set of tables calculates the  $Z''$  Scores at two time observations, the quarter of emergence and one year after emergence. When the latest quarterly filing was not available for the quarter of emergence, the author employed the closest quarterly filing to the emergence data. Due to a few missing data points, the sample size decreased significantly from the original sample one year before filing. In addition, since a Chapter 33 had emerged twice before the third filing, two data points could be collected for each company, despite some unavailable information from the balance sheet. The last column of each table represents the number of years between emergence and the second filing occurrence. It is important to note that liquidation cases were omitted, since these companies never emerged. Due to the lack of information, it is impossible to prove whether liquidation scenarios could have fared better than other categories if the companies were to reorganize successfully.

**Chapter 22 that Filed in 5 Years**

Chapter	At Emerg	1 Yr After	# Years
Penn Traffic	4.3848	4.3848	4
Nucentrix Broadband	10.6042	9.5218	4
Pillowtex Corporation	3.8039	NA	1
Homeland Holdings	-0.5922	-0.6648	5
Payless Cashways	5.2694	5.1499	4
Planet Hollywood	-3.6323	-6.7718	1
Trism	-1.4056	-0.8161	2
Galey & Lord	-0.1453	NA	2
Westmoreland	2.1189	NA	2
Intelogic	NA	-1.6869	0
Bradless Inc	3.1743	NA	1
Ithaca Industries	6.8634	5.6641	4
Lamonts Apparels	2.2504	NA	3
US Airways	2.5817	3.9582	1
Smith Corona	3.3677	4.4294	3
Mcleod Usa	3.4522	3.0277	3
Rymer Food	3.9064	4.4151	4
Brendle's Inc	7.7319	7.1950	4
Best Products	7.2038	6.0694	2
Anacomp	3.7193	2.9197	5
American Banknote	0.1546	-0.4484	5
Wherehouse Entert	7.9549	5.2710	7

Average	3.4651	3.0364
Median	3.4522	4.3848
Standard Deviation	3.4500	3.9579
Bond Ratings	B-	CCC+

**Successful Emergences**

Chapter	At Emerg	1 Yr After
Elsinore Corp	3.9210	3.5997
EI Paso Electronic	2.6270	4.3818
Gantos Corporation	6.5653	6.1711
Hexcel Corporation	4.9073	4.8643
Emcor Group	4.0396	4.3761
Kash N' Karry	4.2740	4.6766
Lone Star Industries	4.3728	5.0388
Telemundo	4.9992	4.9842
Boonton Electronics	6.5015	7.6264
Cherokee	1.6637	3.0990
Emerson Radio	5.4257	4.0867
Grant Geophysical	2.7393	4.1399
JPS Textile	6.0433	6.4020
Krystal Company	9.4198	9.4081
Singing Machine	9.1856	21.4613
Stratosphere Corp	8.1613	8.5616
PhoneTel	3.5435	-4.2992
Hvide Marine	3.6900	3.6400
Philip Services Corp	NA	4.8616
Teletrac	3.8200	2.5400

Average	5.0474	5.4810
Median	4.3728	4.7691
Standard Deviation	2.1486	4.6518
Bond Ratings	BB+	BBB-

**Chapter 33**

Chapter	At Emerg	1 Yr After	# Years
Grand Union 1	2.2081	1.8883	3
Grand Union 2	3.5701	0.7827	2
Memorex Telex 1	-0.4877	1.3703	2
Memorex Telex 2	0.6192	-1.3017	2
Salant 1	3.0548	-1.4135	5
Trans World Air 1	2.1690	1.9777	2
Trans World Air 2	3.0455	2.0686	6
United Merchants 2	-1.5099	-0.0277	2
Samuels 2	4.6031	6.0411	5
Anchor Glass 1	1.4276	1.3868	5
Anchor Glass 2	1.7591	1.3305	3
Harvard Industries 1	2.3832	1.0963	5
Harvard Industries 2	-3.6776	1.1972	4

Average	1.4742	1.2613
Median	2.1690	1.3305
Standard Deviation	2.2724	1.8276
Bond Ratings	CCC-	CCC-

**Chapter 22 that Filed after 5 Years**

Chapter	At Emerg	1 Yr After	# Years
LTV Corp	4.0966	5.2727	7
Magellan Health	3.6196	3.4736	11
Ames Dept. Stores	6.0138	5.9593	9
Casual Male Corp	7.2411	7.0468	11
USG Corporation	4.2148	3.9451	8
EaglePitcher	6.0863	6.1656	9
Paul Harris	6.3382	8.3759	8

Average	5.3729	5.7484
Median	6.0138	5.9593
Standard Deviation	1.3776	1.7059
Bond Ratings	BBB-	BBB

Each category exhibits a higher average than the respective pre-bankruptcy Z” Score. The bond rating equivalents range from CCC- to BBB, as opposed to D to CCC+ in the case of pre-bankruptcy. On average, most firms in the category fall into a similar



range of Z” Scores at emergence and one year after, with some category having a higher at emergence average score and some having a lower score. Furthermore, the data points obtained at emergence and one year after are more statistically significant due to the lower standard deviation within each category relative to the pre-bankruptcy data.

From the at emergence time observation, Chapter 33 has the lowest average Z” Scores, followed by Chapter 22 that filed in 5 years, Successful Emergences and Chapter 22 that filed after 5 years. Although the author expected Successful Emergences to exhibit the highest Z” Score, the mean at 5.0474 is only 0.3255 lower than the average Z” Score of Chapter 22 that filed after file years at 5.3729. The difference can be attributed to the small sample nature of Chapter 22 that filed after 5 years, with only 7 observations compared to 22 observations those that filed in 5 years.

Grouping all occurrences of Chapter 22 & 33 together to test the average Z” Scores against Successful Emergence, the author performed the Student’s T-test for significance level in the difference of the means.

### **T-Test**

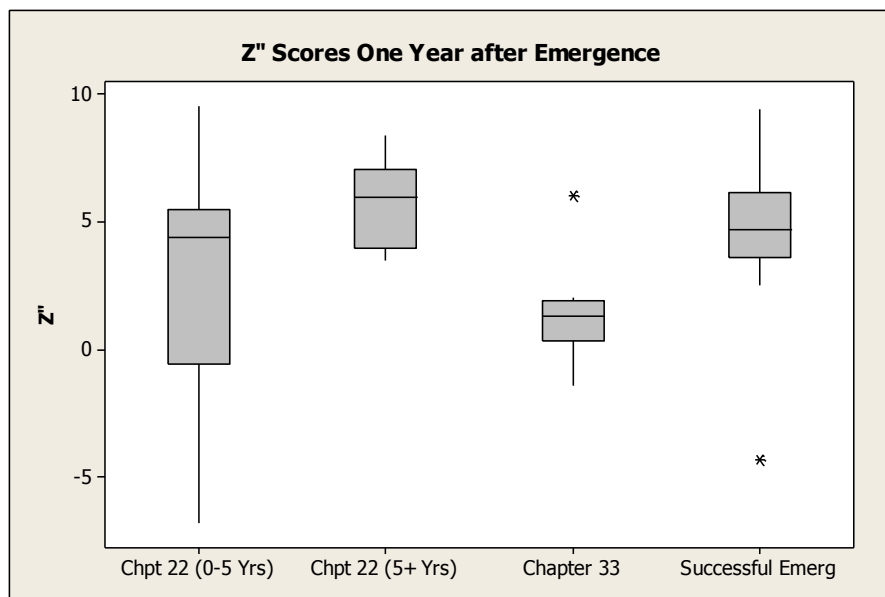
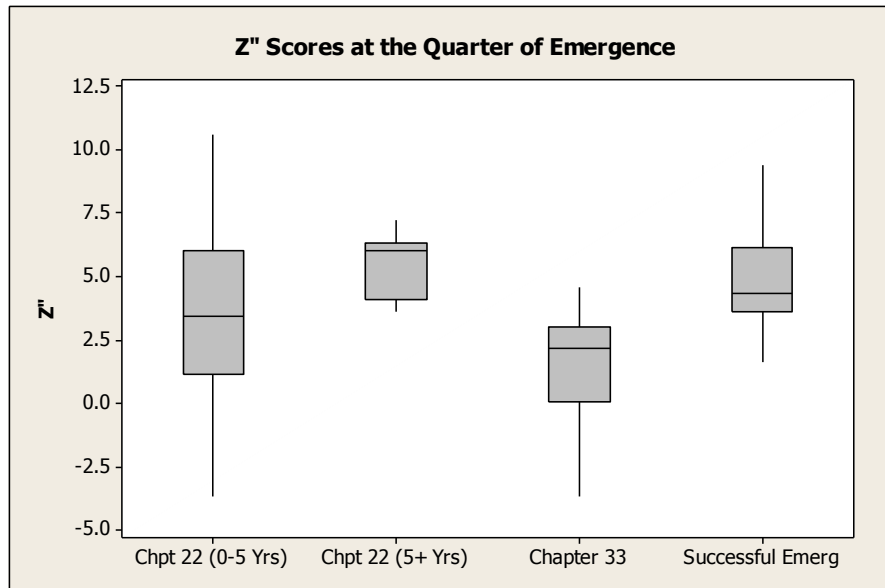
<b>Z" At Emergence</b>	<b>Chapter 22 &amp; 33</b>	<b>Successful Emergence</b>
Mean	2.976	5.047
Median	3.161	4.373
Standard Deviation	2.824	2.149
# of Observation	42	19

T-Test	1.9747
Confidence Level	0.0250

<b>Z" 1 Year After</b>	<b>Chapter 22 &amp; 33</b>	<b>Successful Emergence</b>
Mean	2.682	5.481
Median	2.494	4.769
Standard Deviation	3.016	4.652
# of Observation	36	20

T-Test	1.6322
Confidence Level	0.0500

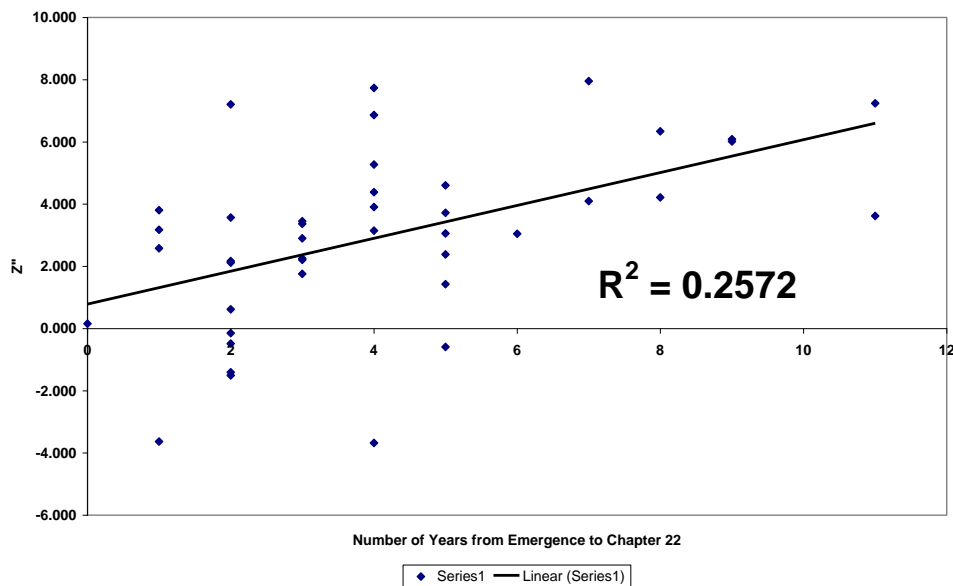
The P value is 0.025 for the time observation at emergence and 0.050 one year after emergence, representing a significant difference in the means. The following box plots graphically illustrate all four categories.



Most categories exhibit different medians, with Chpt 22 (0-5 Yrs) containing the highest variance. Chpt 22 (5+ Yrs) and Successful Emergence have a similar range, and Chapter 33 has the lowest Z' Scores.

Having tested that the Z'' Scores are statistically different, the paper proceeds to prove whether the Z'' Scores are indicative of post emergence success. The following scatter plot graphs the relationship between the Z'' Scores and the number of years between emergence and the second filing for Chapter 22 and 33 companies. Because a chapter 33 emerged twice before the third filing, two observations can be collected 1) between the first emergence and the second filing and 2) between the second emergence and the third filing. There are 42 observations of Chapter 22 and 33 at emergence.

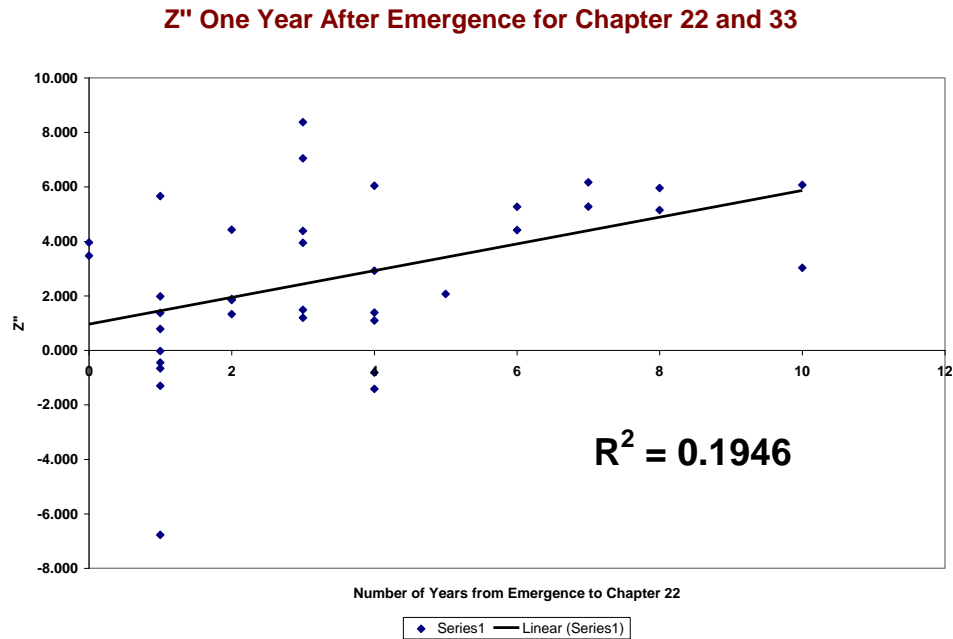
**Z'' Right at Emergence for Chapter 22 and 33**



Considering that the Z'' Score is explaining the number of years from emergence to the next bankruptcy, the R-Squared of 25.72% is significantly high. The scatter plot supports a positively sloping straight line relationship, indicating that the higher the Z'' Score, the longer it takes for a Chapter 22 or a Chapter 33 to refile.

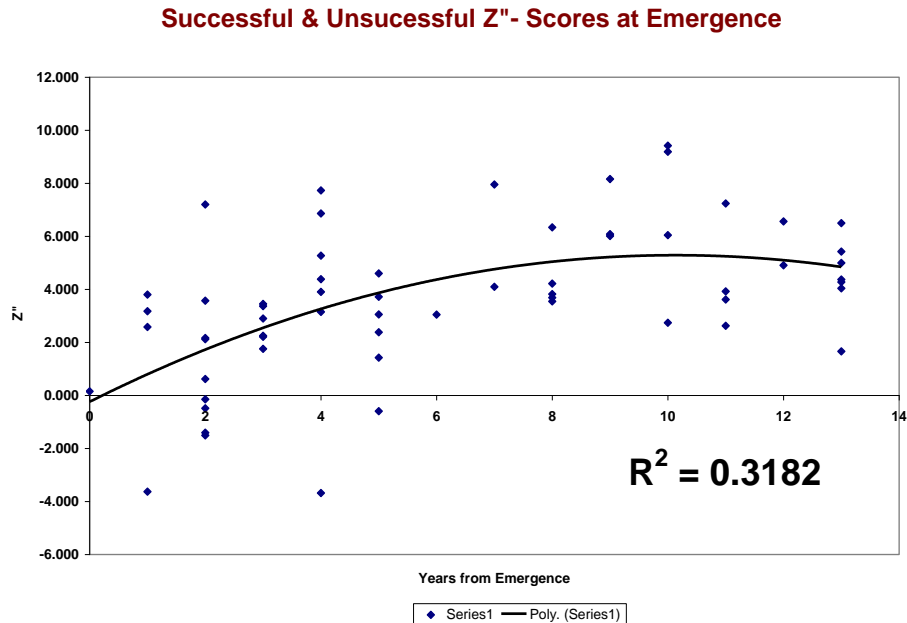
The Z'' one year after emergence also explains 19.46% of the number of years between emergence and the second filing. It is important to note that the R-Squared is lower than the observation at emergence, perhaps suggesting that the financial health of

the reorganized firm at the time of emergence is more indicative of post emergence success. The author included 36 observations of Chapter 22 and 33 one year after emergence. The number of observations differs from the scatter plot at the time of emergence due to the unavailability of data for some companies.



In order to better explain that the Z” Score is indicative of post emergence success, the author proceeded to include a sample of successful emergences from 1994 to 1999. The author arbitrarily assigned the number of years as the difference between emergence and the year this report is written, 2007. Therefore, observations of successful emergences are clustered on the right hand side of the graph, with the years ranging from 8-13, while most of the Chapter 22 and 33 samples are scattered on the left hand side. Because successful emergences never refiled, arbitrarily assigning a number based on a logical assumption that the firm has been solvent since emergence until today is the only way to include this type of firms in the test. The results prove that with the inclusion of

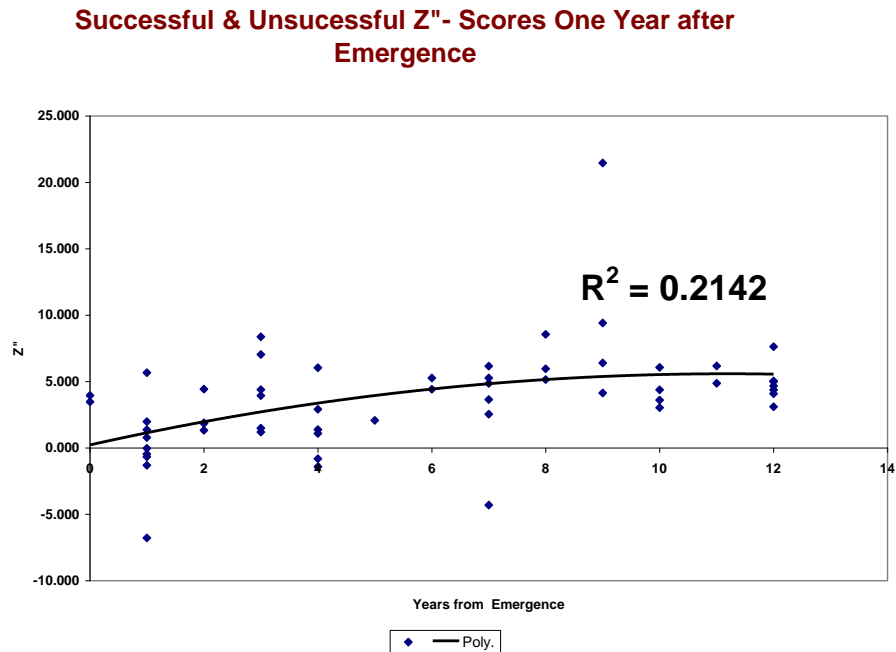
successful emergence observations, the Z'' Score becomes an even better indicator in explaining the number of years between emergence and bankruptcy.



The R-Squared explains 31.82% of the sample, a 6.07% increase from the 25.75% in the first test which only included Chapter 22 and 33 companies. Considering that the Z'' was designed predominantly as a model to predict default probability, the 31.82% R-Squared is extremely high in predicting the number of years from emergence to second filing. The sample size increased to 61 companies from the original scatter plot, with the addition of 19 successful emergences.

The graph on the next page features the relationship between Z'' Scores and post-emergence success at the time observation one year after emergences. There are 56 observations, 36 of which are Chapter 22 and 33, and 20 which are successful emergences. Overall, the R-Squared increased to 21.45% from 19.46%, again emphasizing a marginal improvement from including successful emergences. However, it is important to note that the observation one year after emergence still has lower

explaining power than the observation at the period of emergence.



Although the explaining power is relatively high, framing the test as a scatter plot limits the effectiveness of the Z” Score to only the number of years from emergence to the second filing. In order to analyze the Z” Score as a predictor of post emergence success, the last part of this report focuses on statistical studies that categorize dependent variables into *priori* groups, the Discriminant Analysis and Logistic Regression.

### ***Discriminant Analysis***

In the following Discriminant Analysis, the sample companies are categorized into two categories, successful and unsuccessful. For the time observation at emergence, 42 Chapter 22 and 33 companies are assigned the “1” number, denoting failure. The 19 successful emergences receive a random “0” number, indicating success.

The results are as followed:

Classification Results, The Period of Emergence

	Number Correct	Percent Correct	Percent Error	n	Actual	Predicted	
						Emerge	Not
					Emerge	12	7
					Not	13	29
Type I	12	63	37	19			
Type II	<u>29</u>	<u>69</u>	<u>31</u>	<u>42</u>			
Total	41	67	33	61			

Type I error refers to the scenario when the model predicts refiling, but the company actually emerged. Type II error occurs when the model predicts that the company is going to emerge, but the company becomes bankrupt again. The results show that the model correctly classifies 67% of the total sample, compared to the 95% accuracy from the original paper in 1968. Considering that the Altman Z-Score was originally designed to predict bankruptcy, the 67% effectiveness in forecasting post-emergence success is fairly high.

Classification Results, One Year After Emergence

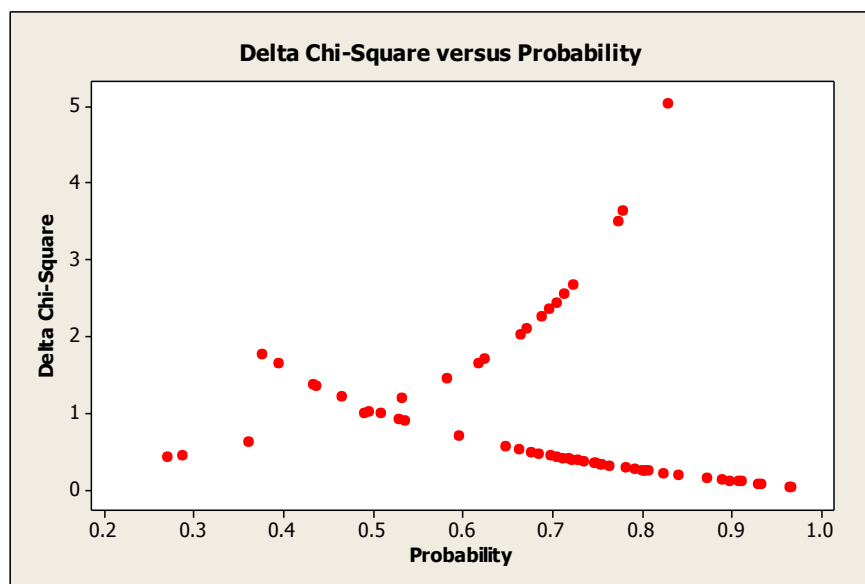
	Number Correct	Percent Correct	Percent Error	n	Actual	Predicted	
						Emerge	Not
					Emerge	15	5
					Not	13	23
Type I	15	75	25	20			
Type II	<u>23</u>	<u>64</u>	<u>36</u>	<u>36</u>			
Total	38	68	32	56			

The test for observations one year after emergence yields similar results, with 68% overall accuracy. However, Type I error improved with percent correct increased to 75% compared to 63% at the time of emergence. The discriminant analysis for one year after emergence is less effective in explaining Type II results, with 64% correct compared to 67% at emergence.

Nevertheless, due to the small sample size obtained by the author, using the discriminant analysis alone may not be sufficient in confirming the hypothesis. The discriminant analysis does not provide many statistics to test the significance of each variable, especially that the sample's means are not very distinct from one another. Therefore, another model is applied to test the results, the logistic regression.

### ***Logistic Regression***

The author performed the binary logistic regression, which also categorizes the sample into two groups, "1" for Chapter 22 and 33 and "0" for successful emergences. For the time observation at emergence, the overall regression has a P-Value of 0.004, which far exceeds the 0.05 value to achieve a 95% confidence level. Regarding the goodness of fit test, the Pearson and Deviance Methods are not accurate indicators because the author employed a 0, 1 refiled or emerged pattern. On the contrary, the Hosmer-Lemeshow Method is applicable, and the P Value of 0.771 indicates a high statistical significance, as the number is close to 1.

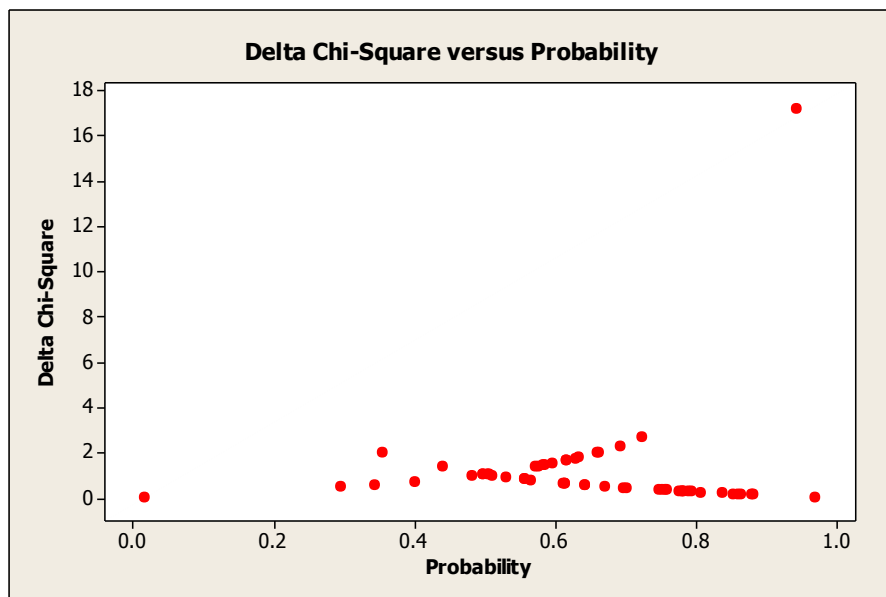




The Delta Chi-Square versus Probability graph measures the square of the standard error of residuals. Any observation more than 6.25 Delta Chi-Square indicates an outlier, as 6.25 is the square of 2.5 standard errors of residuals, which is generally perceived as an outlier. As the data points all fall within the 5 Delta Chi Square range, this data set has no outlier. The graph also exhibits an “X” shape, which is the desired Delta Chi-Square format.

The data points one year after emergence also exhibit a low P Value of 0.005, and therefore are significant at a 95% confidence level. However, the Hosmer-Lemeshow test yields a very low result at 0.061, which is far from the desired output of 1. This is perhaps due to the outlier, Singing Machine, which has a Z” Score of 21.

As a result, although the Delta Chi-Square has the desired “X” shape, Singing Machine is shown as the outlier with Delta Chi-Square of close to 18. Although one should not penalize Singing Machine for having a high Z” Score, because it is a successful emergence, its inclusion skews the statistical analysis.



### *The Reorganization Structure*

From the statistical analysis, it can be concluded that the Z” Scores at the point of emergence and one year after emergence are indicative of post-emergence success, while the pre-bankruptcy scores have no statistical significance. One possible conclusion is that the post emergence firm is a new entity distinct from the original pre-bankruptcy form, because of the new structure endowed by the Reorganization Plan. To further prove this hypothesis, the author dissected the Z” Score and focused on one individual ratio, Total Asset/ Total Liabilities to test the significance of post emergence debt level on success. Although already included in the Z” Score, the ratio on a univariate basis yields significantly high predicting power.

Classification Results, The Period of Emergence

	Number Correct	Percent Correct	Percent Error	n	Actual	Predicted	
						Emerge	Not
					Emerge	7	12
					Not	12	30
Type I	7	37	63	19			
Type II	<u>30</u>	<u>71</u>	<u>29</u>	<u>42</u>			
Total	<u>37</u>	<u>61</u>	<u>39</u>	<u>61</u>			

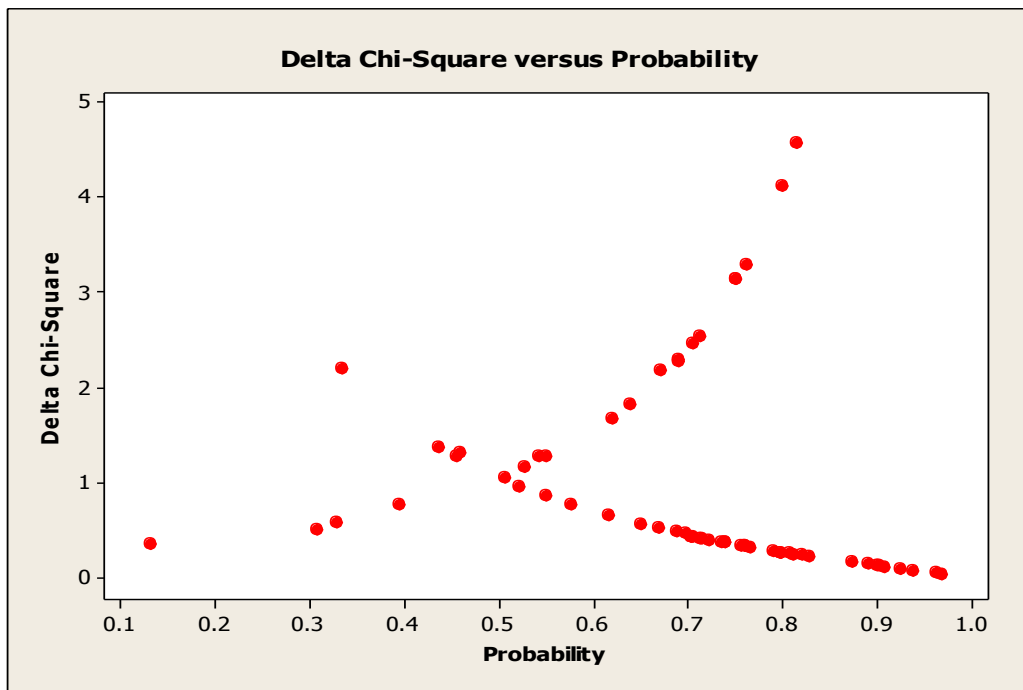
The Total Asset/ Total Liabilities ratio is not as accurate as the multivariate Z”, but it still accurately explains 61% of the sample. However, one pitfall is the high Type I error of 63%. Therefore, the Z” Score still remains a better test for post emergence success as one would assume, for it is a multivariate model. Even with the inclusion of both the Z” Scores and the TA/TL ratio, the explaining power is considerably deteriorated.

Classification Results, The Period of Emergence

	Number Correct	Percent Correct	Percent Error	n	Actual	Predicted	
						Emerge	Not
Type I	10	54	46	19	Emerge	10	9
Type II	<u>30</u>	<u>71</u>	<u>29</u>	<u>42</u>	Not	12	30
Total	40	66	34	61			

Although the accuracy significantly increases compared to only the TA/ TL ratio, the 66% still lags behind the Z” as a standalone basis, which has 67% accuracy.

Attempting to analyze both the Z” and TA/TL ratio with the logistic regression, the author found that the significant level decreased, with the overall P value of 0.013, compared to 0.004 with the Z” on a standalone basis. The Hosmer-Lemeshow P value decreased to 0.564 from 0.771, indicating lower significance.



The Delta Chi-Square versus Probability graph still exhibits an “X” shape, and there is no outlier beyond the 6.25 Delta Chi-Square.

The results prove that the Z" Score, as a multivariate model, has higher explaining power than univariate ratios. However, the significance level of the TA/TL ratio emphasizes the need to negotiate for the optimal debt structure in the Reorganization Plan. As most creditors may be unwilling to swap debt for equity, the discriminant analysis model proves that the right level of debt is crucial to the reorganized firm's success.

### ***Conclusion***

The empirical evidence in this research confirms the difficulty in determining post emergence success at the pre-Chapter 11 stage. Before a Reorganization Plan is drafted and the creditors negotiate for their new stake in the company, analyzing the original entity from current financials can only predict default probability. The findings support the logical assumption that the emerged company would bear little resemblance to the original entity due to the restructuring of business lines and financial structure. Therefore, regarding the inherent subjectivity in the current appraisal process by financial advisors, the author concludes that this practice is most viable in assessing the distressed company in an early stage.

As the firm emerges, the financials at the time of emergence and one year after emergence are indicative of whether they will have to refile or liquidate. With the time of emergence yielding higher explaining power than one year after according to the scatter plot, firms that perform well on the quarter of emergence are likely to fare better than the rest of the sample. As most ratios of the Z" Scores are derived from the Reorganization Plan, such as total liabilities, total assets and working capital, the results emphasize the need for better negotiation among the claimholders. More debt should be swapped for

equity, and unprofitable lines should be divested to improve EBIT margin. The 61% accuracy of the Total Assets/ Total Liabilities ratio on a univariate basis signifies the need to derive an optimal capital structure in the Reorganization Plan.

Another implication is that other than predicting default probabilities, the  $Z''$  Score is also a fairly accurate predictor of post-emergence success. Successful emergences tend to have high  $Z''$  Scores, and discriminant analysis confirmed 67% accuracy at the time of emergence and 68% one year after. Despite the correlation described in this paper, more work remains to be done. As the author pointed out that the financial structure negotiated in the Reorganization Plan should also be indicative of success, one possible area is to study the relationship between the  $Z''$  from the Plan and post emergence success. In addition, this paper attempted to only apply the Total Assets/ Total Liabilities Ratio with the  $Z''$  in discriminant analysis, but other variables may be more significant, such as equity price at the time of bankruptcy announcement.

## **References**

Altman, Edward I and Edith Hotchkiss. *Corporate Financial Distress and Bankruptcy*. 3<sup>rd</sup> ed. John Wiley & Sons, New York, 2006.

Altman, Edward I. "Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA Models." Working paper. July 2000.