

Identifying Earnings Management: The Case of Small-Cap Corporations in the United States

Cecilia Wagner Ricci, PhD

Susan O’Sullivan Gavin, J.D.

Abstract

The purpose of this study is to identify the characteristics of large cap companies that have been sanctioned by the United States Securities and Exchange Commission (SEC) for earnings management, and to test those characteristics on small cap companies to determine whether they can be used to detect earnings management in the small cap space. Thirteen non-accrual financial characteristics identified by previous researchers are tested, including both financial ratios and account levels. Univariate and multivariate analysis are used in the determination of the applicability of large company indicators of earnings management to small cap companies.

I. Introduction

The catalyst for the study is extant research that indicates that earnings management occurs more often in small companies than in larger companies (Ajina *et al.*, 2016, Hoang, 2007; Beasley *et al.*, 1999; Feroz *et al.*, 1991; Persons, 1995; Kreutzfeldt and Wallace, 1986; Kinney and McDaniel, 1989), yet there is little research on earnings management in small cap companies. This study is intended to fill this gap, and thus should be of interest to a variety of entities, including regulators, academics, and practitioners.

The next section presents background information on SEC sanctions. This is followed by a review of the relevant literature. The subsequent sections discuss the sample, the methodology, and results of the empirical tests. The final section presents the conclusions, the limitations of the study, and suggestions for areas of future research.

II. SEC Sanctions

The Securities and Exchange Commission (SEC) seeks various remedies and sanctions, including equitable and administrative, for earnings management conduct in violation of the Securities Act of 1933 and the Securities Exchange Act of 1934. Both individuals and companies can be found liable for violations of the securities acts. The equitable remedy is an injunction to prohibit future illegal conduct. Violation of such an injunction could result in additional monetary penalties and imprisonment for contempt. In addition, the SEC may also seek monetary penalties/fines, and disgorgement of illegal profits. Administrative remedies and sanctions include cease and desist orders, orders for accountings and disgorgement of illegal profits, restatements of earnings, prohibitions from serving as officers and directors, and monetary penalties per the Acts (About the Division of Enforcement). The SEC also has the discretion to enter into agreements that influence the severity of statutory sanctions, including cooperation agreements, deferred prosecution agreements and non-prosecution agreements. (SEC Enforcement Manual). It is also within the power of the SEC to consult with, informally refer matters to, and work cooperatively with federal (Department of Justice) and state enforcement authorities (in any parallel civil and criminal investigations), the Public Company Accounting Oversight Board (PCAOB), federal banking agencies pursuant to the Graham-Leach-Bliley Act, and state professional licensing and association boards (About the Division of Enforcement).

III. Identification of Financial Variables

The identification of the financial variables tested in this study is based upon a review of the

relevant literature, which is the focus of this section. Previous research suggests that there are several ways in which companies engaging in earnings management differ from companies not engaging in earnings management. Many studies have found that companies engaging in earnings management have higher levels of receivables, inventory and long-term debt than companies not engaging in earnings management. For example, Dalnial *et al.* (2014) study publicly listed firms in Malaysia and find that the total debt/total assets, total debt/total equity, inventory/total assets, and receivables/sales ratios are statistically significantly different for fraud and non-fraud companies. In addition, they find that these ratios tend to be higher for firms with fraudulent financial statements. In their study of companies in Lithuania, Kanapickiene and Grundiene (2015) report that the inventory/sales, long-term debt/equity, long-term debt/total assets, receivables/sales, receivables/total assets, and total liabilities/total assets ratios are significantly different. Kaminski *et al.* (2004) use a matched sample of 79 companies to evaluate the usefulness of 21 financial ratios. They find that in the years preceding what they term “the fraud year,” interest expense/total liabilities, sales/accounts receivable, cost of goods sold/sales, and accounts receivable/total assets are significantly dissimilar for the two types of companies. Persons (1995) studies the usefulness of financial statement data as predictors of accounting fraud. She identifies companies’ involvements in fraudulent financial reporting via SEC data, and matches them with non-fraudulent companies. Using stepwise logistic models, she concludes that total liabilities/total assets, receivables/total assets, and inventory/total assets tend to be higher for sanctioned firms as opposed to non-sanctioned firms, and that these differences are statistically significant. Using an Artificial Neural Network to assist in identifying a model for uncovering fraud based on financial statements, Fanning and Cogger (1998) use a set of 102 pairs of companies, matching companies identified by the SEC as having committed fraud with non-fraud companies. They conclude that the accounts receivable/sales, inventory/sales, and long-term debt/shareholders’ equity are statistically significant ($\alpha = 0.01$) and tend to be elevated for sanctioned companies.

There are also several studies dealing with two of the variables. For example, Dichev *et al.* (2013) identify large inventory build-ups, and increasing or high debt as red flags. In her study of earnings manipulation in failing firms, Rosner (2003) reports that such firms have significant increases in accounts receivable, inventory, and sales, and significant decreases in operating cash flows. Beasley *et al.* (1999) find that companies committing financial reporting fraud tend to do so by overstating revenues, accounts receivable, and inventory. Moore (2007) tests combinations of significant variables in order to create a predictive model. She finds that inventory/sales and accounts receivable are statistically significantly higher in sanctioned companies as compared to non-sanctioned companies. Feroz *et al.* (1991) report that most of the AAERs issued by the SEC involve receivables and inventory overstatements. In research concerning earnings management, Roy chowdhury (2006) reports that it is tied to the levels of inventory and receivables. The Securities and Exchange Commission (SEC) *Report Pursuant to Section 704 of the Sarbanes-Oxley Act of 2002* (2003) reports that in the expense recognition area, corporations overstate ending inventory and accounts receivable. Summers and Sweeney (1998) utilize a sample of fifty-one firms that committed fraud between 1981 and 1987 identified via the *Wall Street Journal Index* (matched with firms that had not committed fraud). They report that the inventory/sales ratio is statistically significant in the year preceding the fraud year and that it is higher for sanctioned companies. In their research on detecting fraud, Lendez and Korevec (1999) find that the overstatement of assets via reserve accounts for inventory and receivables is a common method of earnings management.

There is also research related to one of the three areas. For example, Beneish (1999) utilizes a sample of 74 companies that were issued AAERs between 1987 and 1993 to identify variables that detect earnings manipulation, and finds that the receivables/sales ratio is statistically significant. Ricci and Gavin (2014) find inventory manipulating companies tend to have higher inventory than non-inventory manipulating companies. In their study of firms that have been sanctioned by the SEC, DeChow *et al.* (2011) conclude that firms manipulating earnings have higher levels of external financing. Castro and Martinez (2009) find that companies who engage in income smoothing tend to have higher long-term debt. Moreira and Pope (2007) find that the likelihood of earnings management increases as debt increases. In their study of earnings management prior to issuing bonds, Yixin *et al.* (2010) report that firms engage in earnings management with the goal of decreasing their cost of debt. Using logistic regression, Suyanto (2009) finds that the inventory/total assets ratio is significantly different in fraudulent financial statements compared to non-fraudulent financial statements. Concerns about levels of debt may also be seen in the research on earnings management as it relates to violating debt covenants. For example, Hettihewa and Wright (2010) report that in the earnings management arena, managers are likely to make decisions that avoid defaulting on debt covenants. Jha (2013) finds that upward earnings management occurs prior to debt covenant violations. Franz *et al.* (2013) find that firms that are close to breaching debt covenants are more likely to engage in earnings management than firms that are not.

Based on the literature review, thirteen variables were identified. Each category of variable - those relating to inventory, receivables, or debt - includes several measurements, as follows:

Accounts Receivable:

- Gross Receivablesⁱ
- Receivables/Sales
- Receivables/Total Assets

Inventory:

- Inventory
- Inventory/Sales
- Inventory/Total Assets

Debt:

- Long-term debt
- Long-term debt/common equity
- Long-term debt/total assets
- Total liabilities
- Total liabilities/total assets

Overall:

- Sales
- Total assets

IV. Sample

The sample consists of thirty-one small cap companies that had been sanctioned by the SEC matched by market cap in the year preceding the beginning of the earnings management as stated by the SEC, and GIC Economic Sector. Three years of data were available for each company for total of 186 firm-years. The sanctioned companies and their matches may be seen in Appendix A

V. Descriptives

The sample classified by GIC Economic Sector may be seen in Table 1. GIC Sectors 55

Utilities and 50 Telecommunication Services were not represented in the sample. In addition, GIC 40 Financials was excluded from the sample because companies in this sector do not have all of the variables necessary for inclusion in the study. While a larger sample would be ideal, the universe of small cap companies identified as engaging in earnings management and sanctioned by the SEC for earnings management is relatively small. Certainly, one expects that there are companies that have been engaging in earnings management that have not been identified, as well as companies engaging in earnings management who are still at the investigation level and thus unidentified for researchers.

As indicated, the sample is weighted with companies in the Industrials (GIC 20), Information Technology (GIC 45), Healthcare (GIC 35), and Consumer Discretionary (GIC 25) sectors. This mirrors, to some extent, the distribution of the Russell Microcap Index, which is heavily weighted with companies in the Financial Services, Health Care, Technology, and Consumer Discretionary sectors. These sector clusters are also comparable to Beasley *et al.* (1999), who found that sanctioned companies tend to be in the computer hardware and software, other manufacturing, and health care industries. The presence of companies in the IT and Consumer sectors are similar to that of the Deloitte Forensic Center (2009), which reported both to be prominent sectors in terms of earnings management. However, Deloitte also found a high number of telecommunications companies (Deloitte Forensic Center, 2009), as did DeChow *et al.* (2011), while in the current study, Telecommunications Services (GIC 50) is not represented.

Table 2 presents the number of cases on a calendar basis. 32.3 per cent of the sample began the sanctioned behavior between 2006 and 2008. This is followed by 22.6 per cent of the sample in between 2009 and 2011. Over half of the cases occurred between 2006 and 2011. Table 3 contains the descriptives (means, medians, and standard deviations) of each type of company. Companies engaging in earnings management have higher average receivables/sales, inventory/total assets, long-term debt/total assets, and total liabilities/total assets than non-earnings management companies. Moreover, such companies have higher median inventory and long-term debt.

VI. Results

This section contains the results of the analysis. First, paired sample t-tests are used to identify significant differences. Tests are run on the entire sample, the sample classified by GIC Economic Sectors, and annually for the three years prior to the year in which the SEC reports that the earnings management began (Years -1, -2 and -3).

VI.1 Paired Sample T-Tests

The first analysis examines the variables' differences by using the matched sample and the t-test. Table 4 contains the results of the t-tests on the entire sample. As indicated, seven of thirteen variables are statistically significant: three debt-related, one receivables-related, one inventory-related, sales, and total assets. The significance of three of five of the debt ratios suggests that debt may play a role in earnings management.

Table 5 contains the paired sample t-tests results by GIC Economic Sector. The differences among sectors are striking. For example, in GIC 25 Consumer Discretionary, twelve of thirteen variables are statistically significant, while in GIC 20 Industrials, only two are significant. In GIC 25, the only variable that is not significant is inventory/sales. In GIC 35 Health Care, three variables are not significant, one receivables related, one inventory related and one debt related. These results are similar to those of Beasley *et al.* (1999). The only

variable that is significant across all sectors is receivables; the only variable that is not significant in any sector is inventory/sales. These results suggest that detecting earnings management may be more effective when done on a sectoral basis, rather than using a “one size fits all” detection method.

Table 6 shows the variables’ ability to predict earnings management in one, two, and three years (Years -1, -2, and -3, respectively) prior to the year the SEC reports that the earnings management began. Seven of thirteen variables are statistically significant in Year -3, including all of the debt-related ratios and account levels. Total assets and total liabilities were significant in Years -2 and -3. None of the inventory variables was statistically significant, and only one receivables-related ratio was significant in Year -2. None of the variables are statistically significant in Year -1.

The fact that statistically significant differences were detected in Year -3, but for most of the variables, not in Years -1 and -2 is confounding. Nevertheless, the results for the debt-related variables support much of the previous research. One interesting result was that the inventory/sales ratio is not statistically significant in the overall tests, the tests by GIC sector or the tests by the years preceding the earnings management. This is in contrast to the research completed by Fanning and Cogger (1998), Moore (2007), and Summers and Sweeney (1998). Also of interest is that the inventory/total assets and receivables/total assets ratios are significant in only two of the tests. While the receivables-related results may be suspect due to the use of gross receivables and not net, the inventory results may be due to the fact that some of the inventory manipulation is via the cost of sales which does not appear directly in this study.

VI.2 Discriminant Analysis

The large number of independent variables warrants multivariate analysis, and accordingly, discriminant analysis was conducted using earnings management as the criterion variable. The predictor variables are the independent variables used in the univariate analysis. The discriminant analysis is completed using principal component analysis with varimax rotation. The analysis is conducted on overall sample, the sample by GIC Economic Sector, and by the years preceding the earnings management (Years -1 to -3), and the results are presented in this manner.

VI.3 Total Sample

The overall Wilks’ lambda is significant ($p = 0.0056$), indicating that discriminant analysis is merited. The canonical correlation was 0.49. The standardized canonical discriminant function coefficients may be seen in Table 7. The variables with the largest coefficients are total assets, inventory/sales, receivables/sales, and inventory. The classification table for this function, seen in Table 8, shows that 69.3 per cent of the companies were classified correctly, and that this drops to 64.0 per cent in the cross-validation.

VI.4 Sample by GIC Economic Sector

Discriminant analysis was also done by GIC Economic Sector for the categories with the highest number of firm-years, including GIC 20 Industrials (48 firm-years), GIC 45 Information Technology (42 firm-years), GIC 35 Healthcare (34 firm-years), and GIC 25 Consumer Discretionary (34 firm-years). Table 9 contains the Wilks Lambdas and levels of significance for the sample categorized by GIC Economic Sector. As indicated, all are statistically significant, and discriminant analysis was undertaken. Table 10 contains the standardized canonical correlation coefficients used to create the respective discriminant

functions for the GIC Economic Sectors. The variables excluded, indicated by EXC in the table, failed the tolerance tests. Table 11 contains the classification results of the discriminant analysis by GIC Economic Sector. Again, the results vary by sector. The percentage of cases classified correctly in GICs 20 and 25 were 92.3 per cent and 100 per cent, respectively. The cross-validation results were the same. In GIC 35 Health Care, the percentage correct is 86.7, which drops to 60.0 per cent in the cross-validation. The percentage classified correctly in GIC 45 Information Technology is 79.2 per cent, which drops to 75 per cent in the cross-validation.

The next step was to examine the impacts of dividing the sample by Year (Year -1, Year -2, and Year -3). Table 12 shows the Wilks' Lambdas and significance for each year in the three years preceding the earnings management. As indicated, none of the results were statistically significant. Consequently, the null hypothesis cannot be rejected, and thus there is no basis for additional analysis.

VII. Conclusions and Suggestions for Future Research

The research question posed at the beginning of this study is: can the variables used to identify earnings management in large cap companies be used for the same purpose for small cap companies? The overwhelming conclusion of this study is that the "one size fits all" approach to detecting earnings management is not appropriate. Both the univariate and multivariate analyses indicate that the detection of earnings management on a sector by sector basis is necessary.

These results provide several areas for future research. For example, twelve of thirteen variables show statistically significant differences between the two types of companies in the Consumer Discretionary sector (GIC 25), yet in the Industrials sector (GIC 20), only two of thirteen variables are statistically significant. Clearly, additional research must identify the variables that can be used to detect earnings management in the Industrials sector. In addition, only six of thirteen variables in the Information Technology sector were statistically significant, which provides an additional area for future research.

Future research may also investigate the reasons for the results concerning the three years preceding the start of the earnings management. Why would there be no statistically significant differences in the year directly preceding the one in which the SEC says the sanctioned behaviour began, and a large number of differences three years prior to the year in which the sanctioned behaviour began?

Regarding limitations to this study, the major one is the sample size. Unfortunately, the number of small cap companies that have been sanctioned by the SEC for earnings management is small, and there is no action that can be taken to increase the sample size other than the reporting of SEC sanctions. While this is of concern, it does not obviate the need for additional research concerning earnings management in small-cap companies.

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Authors

Cecilia Wagner Ricci, PhD

Professor of Finance, The Feliciano School of Business, Montclair State University, Montclair, USA,

Susan O’Sullivan Gavin, J.D

Associate Professor of Legal Studies, School of Business, Rider University, Lawrenceville, NJ, USA

Appendix A. Sample Companies

Sanctioned Company

Apogee Technology Inc
Black Box Corp
Canadian Solar Inc
China Valves Technology Inc
Comverse Technology Inc
DGSE Companies Inc
DGSE Companies Inc
Diamond Foods Inc
Eco2 Plastics Inc
Fuqi International Inc
Great Lakes Dredge & Dock Corp
Hain Celestial Group Inc
Hansen Medical Inc
Huron Consulting Group Inc
JDA Software Group Inc
LSB Industries Inc
Medquist Inc
Merge Healthcare Inc
Miller Energy Resources Inc
Ocata Therapeutics Inc
Saba Software Inc
Stein Mart Inc
Symbol Technologies
Symmetry Medical Inc
Terex Corp
United Industrial Corp
Universal Travel Group
Verifone Systems Inc
Volt Info Sciences Inc
West Marine Inc

Matching Company

Span-America Medical Sys Inc
Superconductor Technologies
Calamp Corp
Northwest Pipe Co
Ati Technologies Inc
Jaclyn Inc
Ttc Technology Corp
Coca-Cola Bottling
Web Press Corp
Finishmaster Inc
Hawaiian Holdings Inc
Worthington Foods Inc
Align Technology Inc
Forward Air Corp
Triquint Semiconductor Inc
Synalloy Corp
Allegiant Physician Services
Millennium Healthcare Inc
Stratic Energy Corp
Taro Pharmaceutical Industries
Ceragon Networks Ltd
Dillards Inc
Mentor Graphics Corp
US Oncology Inc
Layne Christensen Co
Spar Aerospace Ltd
Silverleaf Resorts Inc
Wyndstorm Corp
G&K Services Inc
Friedmans Inc

GIC	Frequency	Percent
10 Energy	1	3.2%
15 Materials	1	3.2%
20 Industrials	8	25.8%
25 Consumer Discretionary	6	19.4%
30 Consumer Staples	2	6.5%
35 Health Care	6	19.4%
45 Information Technology	7	22.6%

Period	Frequency	Percent
1997 - 1999	5	16.1%
2000 - 2002	5	16.1%
2003 - 2005	3	12.9%
2006 - 2008	10	32.3%
2009 - 2011	6	22.6%

	Type 1: Sanctioned Firms			Type 2: Matching Firms		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
RECEIVABLES						
Receivables	75.32	31.84	98.46	87.53	38.44	115.01
Receivables/sales	0.41	0.19	2.13	0.24	0.16	0.27
Receivables/total assets	0.19	0.18	0.14	0.22	0.18	0.16
INVENTORY						
Inventory	73.00	26.94	116.25	124.51	18.28	283.80
Inventory/sales	0.16	0.12	0.37	0.18	0.14	0.29
Inventory/total assets	0.16	0.11	0.18	0.14	0.12	0.12
DEBT						
Long-term debt	101.99	10.72	173.88	175.86	3.88	256.76
Long-term debt/common equity	0.37	0.04	1.95	1.16	0.12	2.72
Long-term debt/total assets	0.18	0.08	0.23	0.16	0.11	0.20
Total liabilities	213.01	75.01	282.20	407.29	85.74	569.46
Total liabilities/total assets	0.83	0.46	1.90	0.58	0.48	0.57
OTHER						
Sales	449.84	215.82	494.20	803.93	236.82	1,398.82
Total assets	371.24	194.85	369.94	680.43	250.92	998.17

Table 4. Paired Sample t-Test Results, Overall Sample		
	t	Sig
RECEIVABLES		
Receivables	-1.09	(0.1383)
Receivables/sales	0.763	(0.2238)
Receivables/total assets	-1.468	(0.0728)*
INVENTORY		
Inventory	-1.330	(0.0929)*
Inventory/sales	-0.787	(0.2168)
Inventory/total assets	1.036	(0.1515)
DEBT		
Long-term debt	-1.66	(0.0502)*
Long-term debt/common equity	-1.72	(0.0442)*
Long-term debt/total assets	0.548	(0.2926)
Total liabilities	-2.47	(0.0077)**
Total liabilities/total assets	1.239	(0.1093)
OTHER		
Sales	-2.07	(0.0206)*
Total assets	-2.38	(0.0098)**
*** significant at 0.001 ** significant at 0.01 * significant at 0.10		

Table 5. Paired Sample t-test Results by GIC Economic Sector.								
	20 Industrials		25 Consumer Discretionary		35 Health Care		45 Information Technology	
	t	sig	t	sig	t	sig	t	sig
RECEIVABLES								
Receivables	1.76	(0.0455)*	-3.32	(0.0020)***	-2.28	(0.0177)*	3.12	(0.0027)**
Receivables/sales	0.99	(0.1674)	-2.77	(0.0066)**	1.49	(0.0779)*	1.33	(0.0991)*
Receivables/total assets	1.20	(0.1215)	-3.74	(0.0008)***	-0.97	(0.1732)	0.22	(0.4158)
INVENTORY								
Inventory	1.03	(0.1562)	-2.14	(0.0237)*	-1.71	(0.0526)*	1.27	(0.1094)
Inventory/sales	0.13	(0.4503)	-0.70	(0.2460)	-0.13	(0.4499)	-0.78	(0.2231)
Inventory/total assets	0.14	(0.4469)	2.44	(0.0129)*	-1.44	(0.0858)*	-0.63	(0.2684)
DEBT								
Long-term debt	0.87	(0.1961)	-2.93	(0.0047)**	-1.42	(0.0871)*	3.09	(0.0029)**
Long-term debt/common	1.30	(0.1025)	-1.98	(0.0322)*	-1.41	(0.0883)*	-0.13	(0.4489)
Long-term debt/total assets	1.58	(0.0637)*	-1.41	(0.0885)*	0.38	(0.3540)	1.20	(0.1214)
Total liabilities	0.39	(0.3514)	-3.11	(0.0032)***	-2.15	(0.0231)*	3.94	(0.0004)***
Total liabilities/total assets	0.24	(0.4045)	-3.99	(0.0005)***	1.51	(0.0758)*	0.57	(0.2861)
OTHER								
Sales	0.60	(0.2785)	-2.16	(0.0226)*	-2.40	(0.0140)*	2.14	(0.0226)*
Total assets	0.23	(0.4112)	-2.49	(0.0118)*	-2.53	(0.0108)*	3.54	(0.0010)***
*** significant at 0.001 ** significant at 0.01 * significant at 0.10								

Table 6. Paired Sample t-test Results by Year.						
	Year -1		Year -2		Year -3	
	t	(sig)	t	(sig)	t	(sig)
RECEIVABLES						
Receivables	-0.35	(0.3634)	-0.65	(0.2588)	-0.93	(0.1809)
Receivables/sales	0.92	(0.1832)	-1.63	(0.0572)*	0.06	(0.4762)
Receivables/total assets	-0.66	(0.2587)	-1.29	(0.1031)	-0.63	(0.2662)
INVENTORY						
Inventory	-0.44	(0.3333)	-0.75	(0.2301)	-1.17	(0.1259)
Inventory/sales	-0.10	(0.4623)	-0.77	(0.2252)	-0.73	(0.2354)
Inventory/total assets	0.27	(0.3935)	0.95	(0.1748)	0.61	(0.2730)
DEBT						
Long-term debt	-0.53	(0.2988)	-0.99	(0.1658)	-1.54	(0.0667)*
Long-term debt/common equity	-0.81	(0.2128)	-0.71	(0.2403)	-1.41	(0.0838)*
Long-term debt/total assets	-0.57	(0.2865)	-0.16	(0.4380)	1.33	(0.0964)*
Total liabilities	-1.05	(0.1499)	-1.48	(0.0740)*	-1.84	(0.0379)*
Total liabilities/total assets	-1.13	(0.1333)	0.83	(0.2076)	1.41	(0.0847)*
OTHER						
Sales	-0.88	(0.1921)	-1.21	(0.1176)	-1.51	(0.0711)*
Total assets	-0.83	(0.2076)	-1.47	(0.0766)*	-1.86	(0.0362)*
*** significant at 0.001 ** significant at 0.01 * significant at 0.10						

Table 7. Std. Canonical Coefficients, Total Sample.	
	Function 1
RECEIVABLES	
Receivables	-0.97
Receivables/sales	-1.80
Receivables/total assets	1.12
INVENTORY	
Inventory	-1.70
Inventory/sales	2.15
Inventory/total assets	-0.13
DEBT	
Long-term debt	-1.46
Long-term debt/common equity	0.39
Long-term debt/total assets	0.30
Total liabilities	1.75
Total liabilities/total assets	-0.67
OTHER	
Sales	-1.22
Total assets	3.19

Table 8. Discriminant Analysis, Overall Sample.				
	Type	Predicted Group Membership		Total
		1	2	
Original	1	42 (75.0%)	14 (25.0%)	56
	2	21 (36.2%)	37 (63.8%)	58
Cross-validated	1	38 (67.9%)	18 (32.1%)	56
	2	26 (44.8%)	32 (55.2%)	58

Table 9. Wilks' Lambda and Significance by GIC.					
GIC		Wilks' Lambda	Chi-square	df	Sig.
20 Industrials	1	0.15	37.965	12	(.0002)
25 Consumer Discretionary	1	0.11	41.504	10	(.0000)
35 Healthcare	1	0.02	24.255	13	(.0289)
45 Information Technology	1	0.23	22.875	13	(.0432)

	20 Industrials	25 Consumer Discretionary	35 Health Care	45 Information Technology
RECEIVABLES				
Receivables	0.175	-0.404	-0.135	0.611
Receivables/sales	0.331	-1.345	-0.769	1.233
Receivables/total assets	-1.215	1.022	1.222	-2.098
INVENTORY				
Inventory	-0.358	5.197	3.751	-1.306
Inventory/sales	EXC	EXC	1.628	-0.991
Inventory/total assets	1.335	1.064	-0.754	2.220
DEBT				
Long-term debt	-1.912	-4.222	0.617	-3.430
Long-term debt/common equity	1.494	0.222	-2.753	0.663
Long-term debt/total assets	-4.420	2.156	-1.090	8.014
Total liabilities	EXC	EXC	8.104	2.502
Total liabilities/total assets	2.281	-0.546	0.671	-5.951
OTHER				
Sales	-2.478	-1.253	5.523	1.821
Total assets	7.355	EXC	-7.017	-0.575

GIC 20 Industrials				
	Type	Predicted Group Membership		Total
		1	2	
Original	1	12 (92.3%)	1 (7.7%)	13
	2	0 (0.0%)	15 (100.0%)	15
Cross-validated	1	12 (92.3%)	1 (7.7%)	13
	2	0 (0.0%)	15 (100.0%)	15
GIC 25 Consumer Discretionary				
	Type	Predicted Group Membership		Total
		1	2	
Original	1	9 (100.0%)	0 (0.0%)	9
	2	0 (0.0%)	17 (100.0%)	17
Cross-validated	1	9 (100.0%)	0 (0.0%)	9
	2	0 (0.0%)	17 (100.0%)	17
GIC 35 Health Care				
	Type	Predicted Group Membership		Total
		1	2	

Original	1	8 (88.9%)	1 (11.1%)	9
	2	1 (16.7%)	5 (83.3%)	6
Cross-validated	1	5 (55.6%)	4 (44.4%)	9
	2	2 (33.3%)	4 (66.7%)	6
GIC 45 Information Technology				
	Type	Predicted Group Membership		Total
		1	2	
Original	1	13 (92.9%)	1 (7.1%)	14
	2	4 (40.0%)	6 (60.0%)	10
Cross-validated	1	12 (85.7%)	2 (14.3%)	14
	2	4 (40.0%)	6 (60.0%)	10

Table 12. Wilks' Lambda and Significance by Year

		Wilks' Lambda	Chi-square	df	Sig.
Year -1	1	0.879	4.462	7	(0.7252)
Year -2	1	0.808	6.943	7	(0.4349)
Year -3	1	0.753	8.644	7	(0.2792)

ⁱ Many small-cap companies do not report their allowances for doubtful accounts. Consequently, the authors used gross receivables rather than net receivables in this study.