USE OF FINANCIAL RATIOS TO MEASURE THE QUALITY OF EARNINGS

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ABSTRACT

We propose the EQ Score, a user-friendly model derived from the Q Test developed by Putman et al. (2005) to measure earnings quality and detect earnings management in financial statements. It is comprised of five financial ratios and the data needed to compute the EQ Score is readily available to any reader of annual financial statements. We find the EQ Score means for the firms that have been on the receiving end of S.E.C. enforcement actions for financial reporting are significantly lower than the EQ Scores for the socially responsible, admired firms. However, the proposed EQ Score of 5.00 is not a reliable benchmark for classifying reported financial statements as either high earnings quality or low earnings quality.

Keywords: Earnings Quality, Earnings Management, Financial Ratios, Financial Analysis.

INTRODUCTION

The Financial Accounting Standards Board's (FASB) Financial Accounting Concepts No.1 begins, "Financial reporting is not an end in itself but is intended to provide information that is useful in making business and economic decisions".[1] Edmund L. Jenkins, FASB Chairman from 1997 through 2002, states, "Our objective is to make sure that investors have the financial information they need to make well-informed investment decisions. Having credible, comparable and transparent information is essential to that process".[2]

Earnings quality is the degree to which reported earnings reflect true earnings. Judgment, estimates and discretion are involved in the preparation of reported financial statements. The preparer would generally prefer to report more favorable results and may use this flexibility to manage earnings and improve reported results, but earnings quality will suffer in the process.

Currently, there is no widely accepted direct means of measuring earnings quality suitable for use by individual investors who do not have the expertise or inclination to use a complex algorithm or time series data. Edward Altman developed the Z Score in the 1960s, a reliable and user-friendly financial model which is used to predict corporate bankruptcy within the next 2 years. Five financial ratios are used to compute the Z Score and all variables except for the market value of equity are found on the firm's accounting statements. The development of a reliable earnings quality measure similar to the Z Score would be valuable to all readers of financial statements. Since financial ratios have proven effective in predicting financial failure, perhaps they may also be used to measure earnings quality and detect earnings management.

The purpose of this study is to test a model for detecting earnings management in financial statements that the small, individual investor can apply. Putman, Griffin & Kilgore (2005) propose the Q Test, a user-friendly model for quantifying earnings quality. It is comprised of financial ratios computed from the annual financial statements found in the Securities and Exchange Commission (S.E.C.) 10-K filings. The data needed is readily available and the Q Test is simple to calculate and interpret. We revise two variables from the original Q Test model to compute the Earnings Quality Score or EQ Score. First, we correct a measurement interpretation issue. Second, a model coefficient is changed to more accurately reflect the average maturity of corporate borrowing. We perform a preliminary and exploratory test of the EQ Score on the financial statements for a sample of ten companies. The first hurdle the model must clear is the ability to detect differences in the earnings quality of companies at opposite ends of the earnings quality spectrum. The ten companies are deliberately selected to represent the extremes in earnings quality. Five are assumed to have financial statements of high earnings quality and five are assumed to have financial statements of low earnings quality. Consistent with Putman, Griffin & Kilgore (2005), we hypothesize the EQ Scores for the financial statements with above average earnings quality will be equal to or greater than 5.00 and the EQ Scores for the financial statements of low earnings quality will be less than 5.00.

LITERATURE REVIEW

Financial statements are said to have high earnings quality if they report truthful, useful and relevant information (Beisland & Mersland, 2013). According to Kamp (2002), three elements encompass aspects of quality earnings: (1) Clear indication of on-going costs and revenues, (2) Clear indication of performance of the company's core business and (3) A direct correlation of cash flow with earnings. A "high quality" Earnings per Share would be a relatively true representation of what the company actually earned (i.e., cash generated) (Wayman, 2003). Amernic & Robb (2003) observe quality earnings converge with reported profits of publicly-held companies.

McClure (2004) asserts "quality earnings" are earnings that are repeatable, are controllable and are efficient cash generators. "Quality" growth in earnings occurs through repeatable sales revenue increases and repeatable decreases in costs rather than one-time actions or events. "Quality" earnings growth is the result of factors within the control of the firm's managers rather than the result of macroeconomic variables. For example, earnings growth for an oil company could be the result of factors beyond the control of the company such as an increase in commodity oil prices. Finally, quality earnings should generate cash efficiently. A firm could increase sales revenue and reported earnings through a relaxation of its credit policies; but the new, riskier credit accounts are less likely to result in cash inflows.

Gibson (1998) states that firms with conservative accounting policies will report earnings of high quality. Further, quality accounting information should provide applicable information to forecast the firm's expected future earnings and cash flows and to explain stock returns (Dechow & Schrand, 2004).

Several measures of earnings quality are proposed in the literature. Dechow, Ge & Schrand (2010) report three categories of measures: (1) Earnings properties such as persistence and predictability, (2) Reaction of common stock prices to earnings news and (3) External announcements of earnings misstatements. Schilit & Perler (2010) argue that deviations from normal profit margins are indicative of accounting manipulation. Amir, Einhorn & Kama (2012) propose a measure of sustainable earnings based on deviations from normal profit margins.

Lower deviation is associated with higher earnings quality. Demerjian et al. (2013) use restatements, earnings persistence, error in the bad debt provision and modified accruals quality and show that management ability is associated with higher quality earnings. Srivastava (2014) uses volatility of earnings, relevance of earnings to returns and matching of expenses to contemporary revenues (as opposed to future revenues) as earnings quality measures. Ewert & Wagenhofer (2015) use reported earnings as a benchmark and find the earnings response coefficient and persistence are closely related to earnings quality.

Dichev, Graham & Rajgopal (2013) surveyed 169 CFOs of public companies about earnings quality and find that high quality earnings are persistent and backed by cash flows, reflecting consistent reporting choices over time. CFOs reported that while the top four influences on quality earnings are the business model of the company, accounting standards, industry and macroeconomic conditions, company choices on internal controls and the company's board of directors are the next most important influences.

The analysis of the relationship between leverage and earnings management has yielded mixed results. Abed, Al-Attar & Suwaidan (2012) and Charfeddine, Riahi & Omri (2013) find no significant relationship between leverage and earnings management; but Kim & Yoon (2008) find indebtedness has a significant negative influence on earnings management. Gonzalez & Garcia-Meca (2013), Leventis & Dimitropoulos (2012), Bekiris & Doukakis (2011) and Nelson & Devi (2010) observe leverage has a significant and positive effect on earnings management. Charitou, Lambertides & Trigeorgis (2011) find financially distressed firms tend to manage earnings toward a positive result more frequently than healthy firms.

Marquardt & Wiedman (2004) find firms that engage in earnings management behaviour which results in increased earnings also have high levels of receivables. A Days Sales in Receivables Index and Leverage Index are among the variables included in the model developed by Dikmen & Kucukkocaoglu (2010) for detecting earnings management by 126 Turkish manufacturing firms. Lee & Choi (2016) study the use of the allowance for doubtful accounts to manage earnings in non-financial Korean firms.

Chan & Walter (1996) investigate the profitability, liquidity and leverage characteristics of publicly traded Singapore firms receiving qualified audit reports. Firms are significantly less profitable and liquid and have significantly more debt in the year of the qualified report. Additionally, profitability and liquidity decrease and debt levels increase in the four years prior to the qualified report.

Dechow, Ge, Larson & Sloan (2011) propose the F Score as a predictor of accounting misstatements. Firm characteristics include accrual quality, financial performance, nonfinancial performance, off-balance-sheet activities and market-related variables. Their results show at the time of misstatements, accrual quality is low, return on assets is deteriorating and the number of employees is declining significantly.

Gao & Huang (2018) use restatements as a proxy of earnings quality to demonstrate the influence of the audit committee on reporting choices, finding that audit committees with an odd number of members are associated with fewer misstatements.

Putman et al. (2005) propose the Q Test, a model to measure earnings quality using variables from the reported financial statements of a sample of publicly held companies. The financial statements for 20 companies are examined over each company's three most recent years of operation and the Q Test Scores for each company are compared to its stock price changes. They conclude the companies among their sample with Q Test scores less than 5.00 should be examined further for earnings management misbehaviour. Scores between 5.00 and

9.99 are associated with financial statements of greater than average earnings quality and scores of 10.00 or higher are indicative of superior earnings quality.

EMPIRICAL MODELS AND DATA

We began with the original model proposed by Putman et al. (2005). The Q Test is the sum of five financial ratios computed using variables from the three major financial statements required as part of the annual 10-K filing with the S.E.C. The variables are: Cash Flow from Operating Activities, Sales Revenue for the accounting period and the previous period, Accounts Receivable for the accounting period and the previous period, Earnings before Interest and Taxes, Income from Continuing Operations, Net Income and Total Liabilities.

Each component of the Q Test has an equal weight (0.20) in the model. Therefore, no one ratio of the five has a greater or lesser impact on the result. For each ratio, a value equal to or greater than one is associated with higher earnings quality; and a value less than one is associated with earnings management. Equation 1 is the original earnings quality measure or Q Test proposed by Putman et al. (2005).

$$\text{Q Test} = (CFO_t/S_t)10 + CFO_t/EBIT_t + COI_t/NI_t + (CFO_t/TL_t)10 + (S_t - S_{t-1})/(AR_t - AR_{t-1}) \qquad (1)$$

Where
$(CFO_t/S_t)10$ = (Cash Flow from Operations in year t/Sales in year t)*10 = Cash Flow Margin
$CFO_t/EBIT_t$ = Cash Flow from Operations in year t/Earnings before Interest and Taxes in year t = Operating Cash Ratio
COI_t/NI_t = Income from Continuing Operations in year t/Net Income for year t = Repeatable Earnings Ratio
$(CFO_t/TL_t)10$ = (Cash Flow from Operations in year t/Total Liabilities in year t)*10 = Leverage Ratio, and
$(S_t - S_{t-1})/(AR_t - AR_{t-1})$ = (Sales in year t–Sales in year t-1)/(Receivables in year t–Receivables in year t-1) = Receivables Accruals Ratio.

Three of the ratios include Cash Flow from Operating Activities (CFO) from the statement of cash flows. The cash flow margin or CFO divided by Sales, measures the efficiency of cash collections from sales. Violations of G.A.A.P. with regard to sales revenue recognition are a dominant reason for material misstatements (Stallworth and Digregorio, 2004). Putman et al. (2005) assume a ratio of .10 or ten percent for the cash flow margin is a sound result; and the ratio is multiplied by 10 to achieve a value of 1.00. Firms with cash flow margins less than 10% will have results less than 1.00 for this ratio.

CFO is divided by earnings before interest and taxes to compare the convergence of cash provided by operations to reported operating earnings (Amernic & Robb, 2003). Prior research emphasizes the importance of the relationship between earnings and cash flow (Kamp, 2002; McClure, 2004; Dichev, Graham & Rajgopal, 2013). The operating cash ratio evaluates the firm's ability to generate cash from its business operations.

Finally, greater indebtedness will increase incentives for managers to manipulate earnings (Chan & Walter, 1996; Charitou, 2011); therefore, a leverage ratio is included in the model. In the original equation, a multiplier of 10 is used for the CFO to total liabilities ratio. Putman et al. (2005) assume a company that is able to pay all of its liabilities from its cash flow in a ten-year span is financially sound.

Net income from continuing operations represents repeatable earnings which McClure (2004) and Dichev, Graham & Rajgopal (2013) associate with earnings quality. It is compared to the bottom line net income figure. Repeatable earnings ratios less than 1.00 measure the degree to which discontinued operations and other extraordinary items reduce the predictability and persistence of reported earnings.

The ratio of the change in sales to change in receivables is used to capture the reliance on credit sales versus cash sales. Receivables accruals are found to be negatively related to earnings quality in prior studies (Marquardt & Wiedmen, 2004; Dikmen & Kucukkocaoglu, 2010; Dechow et al., 2011). Equal dollar changes in sales and receivables will result in a value of 1.00 for the receivables accruals ratio. A larger dollar increase in receivables than in sales signals a reduction in earnings quality and the ratio is less than 1.00. Interpretation problems exist, however, when the sales and receivables change in opposite directions from one year to the next. The result will be negative if sales decrease and receivables increase, a weakening in the firm's financial position. The calculation also results in a negative ratio if sales increase and receivables decrease from one period to the next, but this change is generally associated with a strengthening in the firm's financial position.

Two ratios from the original Q Test are altered to compute the revised EQ Score which is presented in Equation 2.

$$\text{EQ Score} = 10[CFO_t/S_t] + CFO_t/EBIT_t + COI_t/NI_t + 5\,[CFO_t/TL_t] + [(S_t/AR_t - S_{t-1}/AR_{t-1}) + 1] \qquad (2)$$

Where,
$(S_t/AR_t - S_{t-1}/AR_{t-1}) + 1$ = [(Sales in year t/Receivables in year t) - (Sales in year t-1/Receivables in year t-1)+1] = Receivables Accruals Ratio.

First, a multiplier of 5 with the leverage ratio (CFO/Total Liabilities) is used for the EQ Ratio instead of 10 as used by Putman et al. (2005), because the average maturity of corporate borrowing is five years (Badoer & James, 2016). Firms with leverage ratios less than 1.00 will require more than 5 years to repay all liabilities and earnings quality will deteriorate.

Second, because of the interpretation issue when the original receivables accruals ratio is negative, this ratio is modified. The revised model, EQ Score, computes the difference between the ratio of sales to receivables for the current period and the ratio of sales to receivables for the previous period. If the ratio is unchanged from one period to the next, the value is zero; therefore, in order to maintain the equal weight of each variable in the formula, 1.00 is added to the ratio. If the ratio increases from one period to the next, this indicates a favorable change as the multiple of sales to accounts receivable has increased; and the result will be greater than 1.00. A decrease in the ratio from one period to the next is an unfavourable change as the multiple of sales to accounts receivable has decrease and the value will be less than 1.00.

Financial data is taken from original annual 10-K filings for each year from 2007 through 2016 for the ten US publicly-traded companies in order to calculate the EQ Model variables for 2008 through 2016. The time period encompasses the most recent financial crisis and recovery period, but this is not a focus of the study. Five of the companies are assumed to have high earnings quality and five are assumed to have low earnings quality. Firms that do not engage in earnings management are expected to consistently have EQ Scores equal to or greater than 5.00; and the firms suspected to have low earnings quality are expected to consistently have EQ Scores less than 5.00.

The names and ticker symbols for the five companies assumed to have high earnings quality are Microsoft (MSFT), Alphabet (GOOG), Disney (DIS), Apple (AAPL) and Colgate-Palmolive (CL). These five companies were the top U.S. companies from Forbes 2015 list of ten companies with best reputations for corporate social responsibility. Four of the companies are also in the top 20 of Fortune's 2015 list of most admired companies in the world. Apple is ranked #1, Alphabet is ranked #2, Disney is ranked #6 and Microsoft is ranked #20. Colgate-Palmolive does not appear on this list. Cao and Omer (2011) report a firm's concern for its reputation will impact the quality of its financial reporting. Our selection process is consistent with the studies by Hong & Andersen (2011) and Kim, Park & Wier (2012) which find socially responsible firms are also "responsible" in their financial reporting. Also, Dichev, Graham & Rajgopal (2013) associate boards and internal controls with quality of earnings, which are the same structures that influence social responsibility. More recently, Alsaadi, Ebrahim & Jaafar (2017) show that Shariah-compliant companies are as likely to manage earnings as companies that are not Shariah-complaint. However, companies with a high degree of corporate social responsibility are less likely to manage earnings.

The S.E.C. Accounting and Auditing Enforcement Releases (AAER) for 2007 through 2016 are reviewed to identify companies assumed to have low earnings quality. A group of 54 nonfinancial companies with enforcement actions resulting from financial reporting irregularities is compiled. Companies that are not registered with the S.E.C. and/or that did not file 10-K reports throughout the time period of the study are deleted. Consistent with NASDAQ listing requirements, all companies with common stock prices that dipped below $4.00 at some time during the time period of study are deleted. Nine companies remain from the initial group of 54. The names and ticker symbols for the five companies selected from the nine remaining companies assumed to have low earnings quality are Computer Sciences Corporation (CSC); Logitech International (LOGI)); Monsanto Company (MON); CVS Caremark (CVS); and Great Lakes Dredge and Dock Corporation (GLDD). The companies are diverse in size and industry. The use of official accounting enforcement actions to identify "bad actors" is consistent with Dechow et al. (2011) and Strohmenger (2014). It is assumed the tendency to manage earnings impacts reported financial statements for all time periods in the study and not just the period for which the enforcement action is taken.

RESULTS BY COMPANY

Each ratio in the model is expected to have a value of 1.00 or more for companies with high earnings quality and a value less than 1.00 for companies with low earnings quality. Companies with high earnings quality are expected to have composite EQ Scores equal to or greater than 5.00 and EQ Scores are expected to be less than 5.00 for companies with low earnings quality.

Table 1 presents the annual EQ Score results for the five companies presumed to have low earnings quality. No firm from this group had EQ Scores of less than 5.00 for every year from 2008 through 2016, but all had EQ Scores of less than 5.00 for at least 2 years. Of the 45 total EQ Scores reported for this group, 19 are less than the benchmark of 5.00, as predicted and 25 are less than 6.00. One of the Scores is negative, 2013 for CVS. From 2008 to 2016, 12 of the 45 sets of financial results resulted in S.E.C. enforcement actions. EQ Scores for only 5 of the 12 sets of financial statements are less than 5.00. Generally, the EQ Scores do not offer strong support for the benchmark of 5.00 to separate the low earnings quality firms from high earnings quality firms.

CSC	2008	2009	2010	2011	2012	2013	2014	2015	2016	AVG
Table 1 EQ SCORES FOR LOW EARNINGS QUALITY FIRMS										
(CFO/S)*10	0.81	1.19	1.02	0.97	0.74	0.75	1.20	1.18	1.13	1.00
CFO/EBIT	1.14	1.64	1.32	1.45	6.61	1.28	1.37	4.45	4.43	2.63
COI/NI	1.00	1.00	1.00	0.98	1.00	0.54	0.92	-4.50	0.27	0.25
(CFO/TL)*5	0.65	0.98	0.83	0.91	0.70	0.69	1.05	0.99	0.70	0.83
Δ(S/AR)+1	1.15	1.72	0.77	1.12	1.56	0.81	1.02	1.43	-0.26	1.04
EQ Score	4.76	6.53	4.93	5.44	10.61	4.07	5.57	3.54	6.28	5.75
MON	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	2.46	1.98	1.33	2.38	2.26	1.84	1.93	2.07	1.92	2.02
CFO/EBIT	1.03	0.72	0.87	1.12	0.97	0.77	0.75	0.88	1.09	0.91
COI/NI	0.99	0.99	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99
(CFO/TL)*5	1.62	1.43	0.90	1.73	1.86	1.73	1.09	1.04	0.67	1.34
Δ(S/AR)+1	0.79	2.75	0.36	-0.02	2.53	2.55	0.21	2.30	-1.16	1.14
EQ Score	6.89	7.88	4.46	6.21	8.62	7.88	4.96	7.28	3.51	6.41
LOGI	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	1.66	0.91	1.86	0.66	0.85	0.56	0.97	0.85	0.91	1.02
CFO/EBIT	1.37	1.83	4.66	1.10	2.72	-0.46	2.70	11.68	1.42	3.00
COI/NI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.08	1.01
(CFO/TL)*5	3.47	2.37	3.04	1.19	1.39	0.91	1.59	1.34	1.62	1.88
Δ(S/AR)+1	0.69	4.98	0.75	0.07	2.23	2.31	1.00	1.06	3.38	1.83
EQ Score	8.18	11.08	11.31	4.03	8.19	4.32	7.26	15.92	8.40	8.74
CVS	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	0.45	0.41	0.50	0.55	0.54	0.46	0.66	0.55	0.57	0.52
CFO/EBIT	0.65	0.63	0.78	0.93	0.92	0.72	0.93	0.89	0.97	0.82
COI/NI	1.04	1.00	1.00	1.01	1.00	1.00	1.00	1.00	1.00	1.01
(CFO/TL)*5	0.75	0.78	0.98	1.11	1.18	0.86	1.26	0.75	0.87	0.95
Δ(S/AR)+1	0.58	2.85	2.48	-0.86	2.31	-3.50	0.87	-0.49	2.70	0.77
EQ Score	3.47	5.66	5.74	2.72	5.96	-0.46	4.71	2.69	6.11	4.07
GLDD	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	0.25	0.87	1.80	0.39	-0.03	1.02	0.60	0.34	0.50	0.64
CFO/EBIT	0.57	1.28	1.81	0.45	-0.12	1.46	2.05	1.27	2.63	1.27
COI/NI	1.00	1.00	1.00	1.00	1.00	-0.57	2.01	1.00	1.00	0.94
(CFO/TL)*5	0.17	0.64	1.48	0.25	-0.02	0.61	0.38	0.22	0.30	0.45
Δ(S/AR)+1	1.41	0.18	4.15	-0.97	0.39	3.97	0.55	0.42	3.16	1.47
EQ Score	3.40	3.96	10.23	1.12	1.23	6.49	5.60	3.26	7.60	4.76

Each of the five ratios is expected to be less than 1.00 for the firms with low earnings quality in their financial reporting. An examination of the five ratios that comprise the EQ Score show that 102 of the 225 ratios are less than 1.00. The repeatable earnings average ratio is less than 1.00 for three of five companies, but only 10 of 45 observations are less than 1.00. The leverage ratio is less than 1.00 for three of five companies and 25 of 45 observations are less than 1.00. The cash margin ratio average and the operating cash ratio average are less than 1.00 for two companies, but 27 observations are less than 1.00 for the cash margin ratio and 19 observations are less than 1.00 for the operating cash ratio. Only one company had a receivables accruals ratio average of less than 1.00, but 21 of 45 observations are less than 1.00.

For the companies assumed to have low earnings quality, the EQ Scores range from a low of -0.46 (CVS Caremark, 2013) to a high of 15.92 (Logitech International, 2015). By company, the lowest EQ Scores are for CVS Caremark, averaging 4.07 over the nine-year period and ranging from -0.46 to 6.11. Great Lakes dredge and Dock Corporation has the next lowest EQ Score average, 4.76. The highest average EQ Scores for this group are Logitech International's

8.74 and Monsanto's 6.41. The operating cash ratio generally contributes the most to the EQ Scores for low earnings quality firms and the repeatable earnings ratio contributes the least to the EQ Scores of the low earnings quality firms.

Table 2 EQ SCORES FOR HIGH EARNINGS QUALITY FIRMS										
GOOGL	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	3.60	3.94	3.78	3.84	3.31	3.12	3.39	3.47	3.99	3.61
CFO/EBIT	1.18	1.12	1.07	1.24	1.30	1.34	1.36	1.34	1.52	1.27
COI/NI	1.00	1.00	1.00	1.00	1.00	0.95	0.96	1.00	1.38	1.03
(CFO/TL)*5	11.13	10.37	4.77	5.05	3.76	3.95	4.20	4.80	6.33	6.04
Δ(S/AR)+1	1.58	0.19	0.45	1.09	0.38	1.37	1.30	0.46	0.90	0.86
EQ Score	18.49	16.62	11.07	12.22	9.76	10.72	11.21	11.07	14.12	12.81
AAPL	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	2.95	2.78	2.85	3.47	3.25	3.14	3.27	3.48	3.05	3.14
CFO/EBIT	1.53	1.33	2.55	1.11	0.92	1.10	1.14	1.14	1.10	1.32
COI/NI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
(CFO/TL)*5	2.59	1.95	3.39	4.72	4.40	3.22	2.48	2.37	1.70	2.98
Δ(S/AR)+1	-0.25	-1.54	1.97	9.32	-4.84	-0.27	-1.58	4.40	0.82	0.89
EQ Score	7.82	5.52	11.76	19.62	4.72	8.18	6.31	12.39	7.67	9.33
DIS	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	1.44	1.40	1.73	1.71	1.88	2.10	2.00	2.08	2.80	1.91
CFO/EBIT	0.74	0.89	0.98	0.90	0.90	1.00	0.85	0.82	0.92	0.89
COI/NI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
(CFO/TL)*5	0.90	0.86	1.10	1.07	1.21	1.43	1.36	1.38	1.48	1.20
Δ(S/AR)+1	0.99	1.40	0.13	1.03	0.85	1.00	0.78	1.30	-0.34	0.79
EQ Score	5.06	5.56	4.94	5.71	5.84	6.53	5.98	6.59	5.86	5.79
MSFT	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	3.58	3.26	3.85	3.86	4.29	3.70	3.71	3.11	3.91	3.70
CFO/EBIT	0.96	0.93	1.00	0.99	1.45	1.08	1.16	1.60	1.65	1.20
COI/NI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
(CFO/TL)*5	2.96	2.48	3.01	2.61	2.88	2.27	1.95	1.51	1.37	2.34
Δ(S/AR)+1	0.94	1.78	0.58	0.87	1.01	0.78	0.99	1.78	0.44	1.02
EQ Score	9.44	9.45	9.45	9.33	10.63	8.83	8.81	9.00	8.37	9.26
CL	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**AVG**
(CFO/S)*10	1.46	2.14	2.06	1.73	1.87	1.84	1.91	1.84	2.07	1.88
CFO/EBIT	0.74	0.91	0.92	0.75	0.82	0.90	0.93	1.06	0.82	0.87
COI/NI	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
(CFO/TL)*5	1.39	2.08	1.92	1.42	1.45	1.41	1.37	1.23	1.30	1.51
Δ(S/AR)+1	2.43	0.80	1.24	1.32	1.25	1.41	1.48	1.10	0.53	1.29
EQ Score	7.02	6.92	7.15	6.23	6.40	6.56	6.69	6.23	5.72	6.54

The annual EQ Score results for the companies presumed to have high earnings quality in their financial reporting are given in Table 2. All but two of the EQ Scores reported are greater than 5.00 and there are no negative EQ Scores for this group. For 2012, Apple has an EQ Score of 4.72; and for 2010, Disney has an EQ Score of 4.94. Eight EQ Scores are 5.00 to 5.99. The results are generally consistent with what was expected.

Each of the five ratios is expected to be ≥ 1.00 for the firms with high earnings quality. The cash flow margin ratios are greater than 1.00 for every year for all five companies. The repeatable earnings ratio and the leverage ratio are greater than 1.00 for all but two of the 45 observations. The receivables accruals ratio is less than 1.00 for 24 out of 45 observations and the operating cash ratio is less than expected for 20 of 45 observations.

For the companies assumed to have high earnings quality, the EQ Scores range from a low of 4.72 (Apple, 2012) to a high of 19.62 (Apple, 2011). By company, the highest EQ Scores are for Alphabet, averaging 12.81 over the nine-year period and ranging from 9.76 to 18.49. Apple has the next highest EQ Score average, 9.33; and Microsoft's EQ Score average is 9.26. The EQ Score average for Disney (5.79) is less than the averages for Logitech International (8.74) and Monsanto (6.41) from the low earnings quality group. The EQ Score average for Colgate-Palmolive (6.54) is also less than the average EQ Score for Logitech International. The cash flow margin ratio generally contributes the most to the EQ Scores for high earnings quality firms and the leverage ratio is a close second. The receivables accruals ratios tend to contribute the least to the EQ Scores of the high earnings quality firms.

A review of the 45 EQ Scores for each group suggests significant differences for some firms. From the low earnings quality group, EQ Scores range from 4.03 to 15.92 for Logitech International and 1.12 to 10.23 for Great Lakes Dredge and Docks Corporation. From the high earnings quality group, the EQ Scores for Apple range from 4.72 to 19.62 and the range for Alphabet is 9.76 to 18.49. The Levene Statistic is computed to test for a difference in variability among the EQ Scores between the two groups, but the result is insignificant at 0.82 with a probability of 0.37 and supports the assumption of homogeneity of variances. The variability in EQ Scores between the two groups is not statistically different.

Finally, one-tail t tests are run to determine if the mean of the 45 EQ Scores for the low earnings quality group is significantly lower than the mean of the 45 EQ Scores for the high earnings quality group. Also, the means of the five ratios that comprise the EQ Score for each group are examined to determine if the low earnings quality ratio means are significantly lower than those for the high earnings quality group. The null hypotheses are the EQ Score means of the two groups are equal and the means of each ratio for the two groups are equal. The results are reported in Table 3.

Table 3 T-TEST RESULTS FOR EQ MODEL MEANS OF LOW EARNINGS QUALITY FIRMS VERSUS HIGH EARNINGS QUALITY FIRMS		
Variable	T Statistic	Probability
EQ Score	- 4.10***	4.55-E05
(CFO/S)*10	-11.31***	3.94-E19
CFO/EBIT	+ 2.04**	0.02
COI/NI	- 1.29*	0.10
(CFO/TL)*5	- 5.06***	1.14E-06
Δ(S/AR) + 1	+ 0.79	0.21
n = 45 *Significant at 10% **Significant at 5% ***Significant at 1%		

The t statistic for the difference in the means of the EQ Scores is significant at 1 percent; therefore, the null hypothesis is rejected. There is a difference in the EQ Score averages for the two groups and the five bad actors among our ten firms have lower Scores as expected. An analysis of variance test confirms the t test results of the EQ Scores with an F Score of 16.83 and a probability of 0.001.

The t tests of the difference in the means of the leverage ratios and the cash flow margin ratios are both negative and significant at 1 percent. As expected, the means for the low earnings quality group are significantly lower than the means of the high earnings quality group. The t test

for the repeatable earnings means is negative, as expected; and they are also significantly different, but at a 10 percent level.

For the firms in the two groups, the positive t tests indicate the low earnings quality firms have higher operating cash ratios and higher receivables accruals ratios than the high earnings quality firms, which is contrary to expectations. The means of the operating cash ratios are significantly different at the 5 percent level, but the receivables accruals ratios are not significantly different. The receivables accruals ratio is not useful in detecting variation in earnings quality between the two groups of firms in this study. The difference between operating cash flow and earnings before interest and taxes is greater for the low earnings quality firms than for the high earnings quality firms.

CONCLUSION

We propose the EQ Score, a user-friendly model derived from the Q Test developed by Putman et al. (2005) to measure earnings quality and detect earnings management in financial statements. The data needed to compute the EQ Score is readily available to any reader of financial statements and the results are simple to calculate and interpret.

The EQ Score averages for the firms that have been on the receiving end of S.E.C. enforcement actions for financial reporting are significantly lower than the EQ Scores for the socially responsible, admired firms. However, the proposed EQ Score of 5.00 is not a reliable benchmark for classifying reported financial statements as either high earnings quality or low earnings quality. Perhaps, like the Altman Z Score, scores which fall within a certain range are not sufficiently sensitive to flag a firm's financial statements as either high or low earnings quality; but EQ Scores above that range and below that range are useful in identifying high and low earnings quality. Additionally, the firms in this group may not have engaged in questionable earnings management activities for all years in the study.

The leverage ratios, the cash flow margin ratios, and, to a lesser degree, the repeatable earnings ratios have the strongest positive associations with the assumed degree of earnings quality. The operating cash flow to operating earnings ratio is negatively associated with earnings quality, contrary to expectations. The receivables accruals ratio contributes the least to the differences in the overall EQ Scores between the two groups of firms and t tests showed no significant difference in the means for these ratios between the two groups. The samples are small and it could be that the selected firms with presumed managed earnings are not manipulating their earnings through receivables accruals in the years of this study. The methods of earnings management are not identical for all "bad actors" and the receivables accruals ratios may provide more information for a different group of firms.

Several options exist for expanding this research in the future. First, the pool of companies included in the two samples of this study should be expanded for further testing of the model. Second, each ratio should be analysed to determine what it contributes to the model's detection power. Specifically, the receivables accruals ratio and operating cash ratio should be examined to determine if they belong in the model as currently defined. Third, EQ Scores from original reported financial statements and for restated financial statements could be compared to determine if restatements produce improved Scores. Original financial statement results are used in this study. Fourth, each ratio and overall EQ Scores should be examined over time. Specifically, compare the ratio and EQ Scores for periods of recession to those from periods of economic growth to determine if the measures are sensitive to differing economic conditions (i.e., more or less useful in one economic condition than the other). The time period used in this

study includes both economic recession and recovery periods which could be affecting the strength of the results.

ENDNOTES

1. Statement of Financial Accounting Concept No. 1, November 1978, Objectives of Financial Reporting by Business Enterprises, *Financial Accounting Standards Board, Original Pronouncements: As Amended,* CON1-1.
2. "FASB Releases Video on the Importance of Quality Financial Reporting," October 15, 2001 [News Release], *Financial Accounting Standards Board.* Retrieved from http://www.fasb.org/news/nr101501.shtml&pf=true

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