

---

## A MODEL FOR DETERMINATION OF THE QUALITY OF EARNINGS

**Robert L. Putman, University of Tennessee at Martin**  
**Richard B. Griffin, University of Tennessee at Martin**  
**Ronald W. Kilgore, University of Tennessee at Martin**

### ABSTRACT

*This article is grounded on the premise that corporate earnings drive corporate value which subsequently drives stock prices. For example, if a corporation generates better than expected earnings, then corporate value increases and is followed by related stock price increases. Historically, literature suggests that good equity investments are those of companies that show better than average earnings. This close correlation of earnings and stock price movement often exerts an unrealistic demand on top company officials to maintain better than expected earnings figures. Such expectations led to the 'earnings management' phenomenon the United States began experiencing in 2001 that later reached epidemic portions during 2002. This state of affairs prompted a call for the accounting and finance community to do something to detect earnings management practices early so that investors did not continue to lose their life savings when investing in capital markets.*

*The authors propose a model identified as the Q Test that provides a mathematical approach to quality earnings determination. The model is designed along the same lines as Altman's Z Score, which is a widely acclaimed model used to assess companies in various stages of financial distress. The model is tested using financial statements of publicly held companies in which the Q Test is compared to stock price movements of selected companies. Results of the study indicate that the Q Test is a reliable measure of quality of earnings reported by publicly held companies.*

### INTRODUCTION

The marketing profession uses a measurement known as the Q Score in a way to measure the familiarity and appeal of a brand, company, or television show. There is evidence that the Q Score is more valuable to marketers than other popularity measurements such as the Nielsen Ratings because Q Scores indicate not only how many people are aware of or watch a product, but also how those people feel about the product. The music industry uses the Q factor to measure the "quality" of a resonant system. Resonant systems respond to frequencies close to the natural frequency much more strongly than they respond to other frequencies. The authors assert that there is a need for a

measure in accounting that can be used to accurately assess the quality of earnings reported by public companies on financial statements. A mathematical model we identify as the Q Test is proposed in this article.

### **EARNINGS MANAGEMENT**

Earnings management usually consists of one or a combination of the following: 1) over-statement of revenue, (2) understatement of expenses, and (3) misrepresentation of accruals. Such earnings management practices typically cause long-term disastrous results. Often affected companies' stock prices deteriorate to practically nothing in short periods of time (for example, Enron, WorldCom, and Lucent). The earnings management fiasco led to a call for the accounting and finance community to do something to detect the earnings management process early, thereby protecting investors from losing life savings when investing in capital markets. Many accounting and finance journals have included articles that identified ways of distinguishing quality earnings from managed earnings (Brown, 1999, Branner; 2001, Morgenson; 1999; and Krantz, 2002).

### **THE DETERMINANTS OF QUALITY EARNINGS**

"High quality" EPS (Wayman, 2003) means that the number is a relatively true representation of what the company actually earned (i.e. cash generated). Amernic and Robb (2003) observed that quality earnings converge with reported profits of publicly held companies. It has been suggested (Kamp, 2002) that three elements encompass aspects of quality earnings; clear indication of ongoing costs and revenues, clear indication of performance of the company's core business, and a direct correlation of cash flow with earnings.

McClure (2004) purports the three characteristics of 'quality earnings' as those earnings that are repeatable, are controllable, and are efficient cash generators. There are two quality ways to boost earnings: increase sales and cut costs because these are repeatable. Next, earnings growth that is the result of economic or societal factors is not really quality growth. For example, earnings growth in the oil industry could be more the result of uncontrollable factors such as soaring commodity oil and natural gas prices than true economic growth. Finally, quality earnings should generate cash efficiently.

The bankruptcy of W.T. Grant Company in 1975 is an example of a company that showed good earnings until just before it went under (Largay and Stickney, 1980). Revenue increased by 35% from 1972 to 1974 and earnings grew by 7% from 1972 to 1973 before declining by 78% from 1973 to 1974 (Stickney, et al, 2004). Also, Grant financial statements revealed good working capital, current, and acid test ratios up to the year of bankruptcy. The W.T. Grant case is one of the early experiences that involved non-quality reported earnings. Grant's stock prices remained high along with its reported earnings until just before bankruptcy occurred.

Stickney, et al (2004) notes that quality accounting information should be a fair and complete representation of a firm's economic performance, position, and risk. Further, quality accounting information should provide relevant information to forecast the firm's expected future earnings and cash flows.

A search of the literature reveals several ideas that writers suggest as methods for determination of quality or earnings. Most literature surveyed included cash flow from operating activities as an important determinant of quality of earnings. Additionally, recurring themes of continuity of operations and good performance in the company's core business (operating income) surfaced as strong indicators of the quality of reported accounting information. Also, some test should be used to check for persistency and predictability of reported earnings. Performance in the company's core business and continuing operations seem to meet these criteria. Finally, risk plays an important part in reporting quality accounting information. This is especially true for balance sheet presentations where true economic representation of assets and liabilities are important. Inflated earnings create inflated reported values of assets and, likewise, understated expenses are likely to lead to understated liabilities or inaccurate capitalization of expenses. Thus earnings quality has a direct bearing on items reported on the balance sheet.

### **PURPOSE OF THIS STUDY**

In 1968, Edward Altman developed a statistical model that had a 95% success rate in predicting bankruptcies (Eidleman, 1995). Altman used eight weighted variables from the balance sheet and the income statement to arrive at a figure he identified as the Z score. Firms with scores less than 1.81 were considered bankrupt; 1.81-2.99 were in the cautious zone, and greater than 3.00 were considered financially solid. Altman's model was introduced at a time when the determination of whether an entity was a going concern or not was vitally important for auditors. His model merged active measurements from the income statement with passive measurements from the balance sheet. The authors believe there is a need in investment circles for a similar test for the quality of earnings reported on income statements and that the test should incorporate cash flow statement data.

The purpose of this research is to propose a model that will be a reliable determinant of the quality of earnings reported by public companies. It is important to remember that quality of earnings is only one factor that affects stock price movements. In some cases quality earnings might not drive increases in stock prices of the company. Regardless, the authors believe that if a company generates quality earnings, its stock prices will tend to move upward and will not reflect volatility to the extreme that non-quality earnings do.

## MODEL DEVELOPMENT

The model proposed consists of variables from the three major financial statements required by generally accepted accounting principles (cash flow statement included). It is stated as follows with variable definitions given in Exhibit A.

$$Q \text{ Test} = 10(CFO/S) + (IS/IAR) + (CFO/EBIT) + (COI/NI) + 10(CFO/TL)$$

| Exhibit A: Definition of Variables Used |                                      |                     |
|---|--------------------------------------|---------------------|
| Symbol                                  | Description                          | Financial Statement |
| CFO                                     | Cash flow from operating activities  | Cash Flow Statement |
| S                                       | Sales                                | Income Statement    |
| IS                                      | Increase in sales from previous year | Income Statement    |
| IAR                                     | Increase in accounts receivable      | Balance Sheet       |
| EBIT                                    | Earnings before interest and taxes   | Income Statement    |
| COI                                     | Income from continuing operations    | Income Statement    |
| NI                                      | Net Income                           | Income Statement    |
| TL                                      | Total liabilities                    | Balance Sheet       |

Some explanations are in order for the use of variables identified in Exhibit A. Each variable is calculated in a manner to place equal weight (1/5) on it in the total mix. Cash flow from operating activities (CFO) divided by sales is a commonly used ratio that measures efficiency of cash collections from sales (Mills and Yamamura, 1998). Ten percent is considered a good return of cash on sales in a given year. To equalize the weight of these observations we multiply the annually computed ratio by ten. The same is true for CFO divided by total liabilities. If a company can pay all of its liabilities in 10 years from the current stream of CFO, it is considered financially healthy. Accordingly, to give equal weight to the measurement one should multiply the calculated ratio by ten. The other three variables are equally weighted by making the respective calculations, since one (1) is the target for quality earnings determination for each of these three ratios.

The ratio of annual percentage increase in sales divided by percentage increase in accounts receivable is used to evaluate the quality of reported revenue. For example, a larger increase in accounts receivable than sales indicates poor quality earnings. In the case of a decline in sales, one must invert this ratio. Thus, if sales decrease and accounts receivable decrease by a lesser amount (an unfavorable trend), the ratio will be less than one because of the inversion process. Cash flow from operating activities divided by earnings before interest and taxes compares convergence of cash provided by operations to reported operating earnings before interest and taxes. Net income from continuing operations is used in the equation for comparison to the bottom line net income figure,

which often includes discontinued operations and other charges that detract from predictability and persistency of reported earnings. Exhibit B shows the summary and integration of the model.

**Exhibit B: Summary of the Model and Integration of Variables**

$$Q \text{ Test} = 10(\text{CFO}/\text{S}) + (\text{IS}/\text{IAR}) + (\text{CFO}/\text{EBIT}) + (\text{COI}/\text{NI}) + 10(\text{CFO}/\text{TL})$$

$\Downarrow$                        $\Downarrow$                        $\Downarrow$   
 Cash Efficiency     $\Downarrow$     Consistency                       $\Downarrow$     Risk  
                                  Revenue Quality                      Core Operations

### A TEST OF THE MODEL

Figures were obtained from W.T. Grant, Inc.'s financial statements for the three years that preceded its bankruptcy in 1975. The Q Tests calculated were .618, -1.329, and -.832 for 1972, 1973, and 1974 respectively. Clearly, this indicates inferior quality of earnings for Grant during the three years prior to its bankruptcy. Traditional financial analysis at that time did not provide any alarm signals until just before the company collapsed. The model proposed in this paper could have helped investors outrun the impending financial disaster associated with Grant's failure.

### FINDINGS AND DISCUSSION

Financial statements of 20 publicly held companies for the three most recent years of operations were extracted from Microsoft's moneycentral.msn.com Web Page. Figures from the financial statements were then inserted in the model and Q Tests were calculated for each year and for the three-year average. Stock price movement of each of the companies included in the study was observed three months after the close of each company's fiscal year. This procedure provides for adequate time between close of the year and related earnings announcements. Results are presented in Table 1.

Average Q Tests of the companies observed ranged from a high of 19.64 (Microsoft) to a low of .03 (Lexar Media, Inc.). Correction Corporation of America's average was skewed by the cumulative adjustment for change in accounting principles of over \$80 million in 2002. Otherwise, the average would have been 5.63.

As can be seen from Table 1, nine of the 20 companies showed gains in stock prices each year over the three-year period observed. Target, Nokia, Home Depot, and Ericsson had losses over the three-year period but impressive gains from year two to year three. Halliburton and Lexar Media reflected deteriorating Q Tests over the three-year period, indicative of poor quality earnings for these two companies. Even so, both companies posted stock price gains during this time.

Halliburton's large stock price gain in the third quarter 2004 more than likely is attributable to the war in Iraq and no bid contracts rather than the quality of its earnings. TyCo experienced a corporate scandal in 2002 that apparently has not affected stock prices to a great extent. Strong companies such as TyCo tend to recapture stock price losses caused from unfavorable media releases much easier than weaker companies regardless of quality of earnings. Accredo was the only company in the sample that showed losses in stock prices in both the three-year period and from year two to year three.

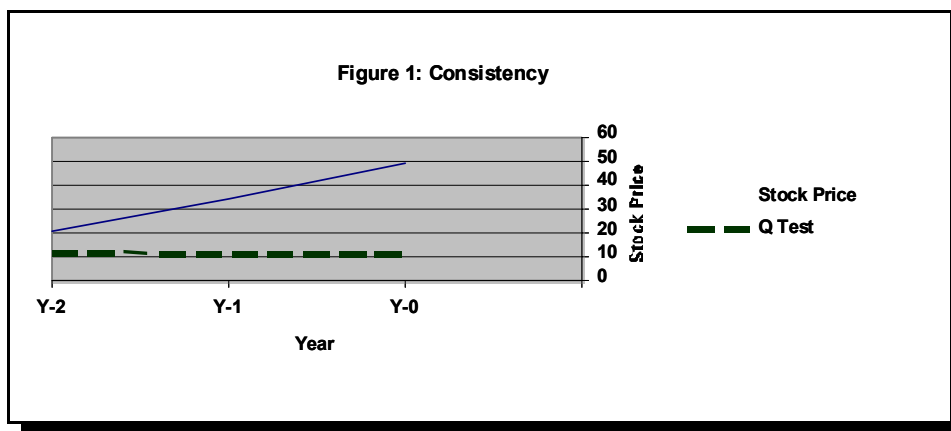
**Table 1: Q Test and stock price movement**

| Company             | FYE | QT<br>Y-2 | QT<br>Y-1 | QT<br>Y-0 | QT<br>Avg | Price<br>Y-2 | Price<br>Y-1 | Price<br>Y-0 |
|---------------------|-----|-----------|-----------|-----------|-----------|--------------|--------------|--------------|
| Oracle Systems      | 5   | 13.37     | 13.70     | 13.03     | 13.37     | 9.59         | 12.83        | 9.97         |
| EBAY                | 9   | 17.70     | 15.65     | 16.85     | 16.73     | 16.96        | 32.31        | 8.17         |
| Black & Decker      | 12  | 4.87      | 5.37      | 5.26      | 5.17      | 34.86        | 56.94        | 78.99        |
| Adobe               | 11  | 11.96     | 15.63     | 26.59     | 18.06     | 27.50        | 37.25        | 61.75        |
| Wal-Mart            | 1   | 5.68      | 7.13      | 13.86     | 8.89      | 55.86        | 56.32        | 57.01        |
| Pepsico             | 12  | 6.61      | 7.32      | 8.56      | 7.50      | 40.00        | 53.85        | 53.84        |
| Ericsson            | 12  | -62       | 1.43      | 7.82      | 2.88      | 41.80        | 6.36         | 27.76        |
| Cisco               | 7   | 16.60     | 10.62     | 13.60     | 13.10     | 11.18        | 20.93        | 19.21        |
| Corrections Corp    | 12  | 4.37      | -9.83     | 6.90      | .48       | 13.00        | 17.46        | 35.60        |
| Target              | 1   | 3.58      | 2.90      | 6.39      | 4.29      | 43.65        | 33.44        | 35.64        |
| Home Depot          | 1   | 12.18     | 7.88      | 13.25     | 11.10     | 48.61        | 24.36        | 37.36        |
| McAfee, Inc.        | 12  | 6.79      | 6.05      | 18.06     | 10.30     | 13.81        | 18.00        | 22.56        |
| Lucent              | 9   | 2.68      | 1.20      | 2.00      | 1.96      | 1.26         | 2.84         | 3.76         |
| TyCo, International | 9   | 2.63      | .29       | 1.43      | 4.37      | 17.08        | 21.50        | 35.74        |
| Microsoft           | 6   | 17.02     | 25.90     | 16.00     | 19.64     | 21.87        | 27.80        | 27.65        |
| Axiom               | 3   | 11.03     | 18.32     | 10.75     | 13.37     | 17.49        | 15.25        | 24.83        |
| Accredo             | 6   | 3.06      | 20.47     | 4.81      | 9.45      | 31.79        | 27.99        | 23.57        |
| Nokia               | 12  | 17.25     | 14.13     | 10.89     | 14.09     | 20.74        | 14.01        | 20.28        |
| Lexar Media, Inc.   | 12  | 2.22      | .16       | -2.28     | .03       | 3.28         | 16.56        | 4.98         |
| Halliburton         | 12  | 4.34      | 2.12      | .30       | 2.25      | 17.07        | 20.73        | 30.39        |

FYE=Month of end of fiscal year; QT=Q Test; Y-2=First year of series; Y-1=Second year of series; Y-0=Current year; Price=Stock price three months after the close of each year

Oracle, Black & Decker, Home Depot, Wal-Mart, Pepsico, Target, and Microsoft had Q Test scores that moved in the same direction as their stock prices each year. Each of these companies showed above average or improved trends in quality of earnings. Accredo's Q Test increased from 3.06 to 20.47 and then dropped to 4.81. Its stock price declined over 50% during those two years. Lucent, with its very poor quality of earnings experienced nominal gains in its stock price over the three years. It should be noted that Lucent's Q Test results indicate a favorable trend even though the test results continued to be somewhat lower than other companies in the sample. Ericsson shows an impressive gain in Q Test scores and stock price from year two to year three. This indicates improved quality of earnings and a related improvement in stock prices.

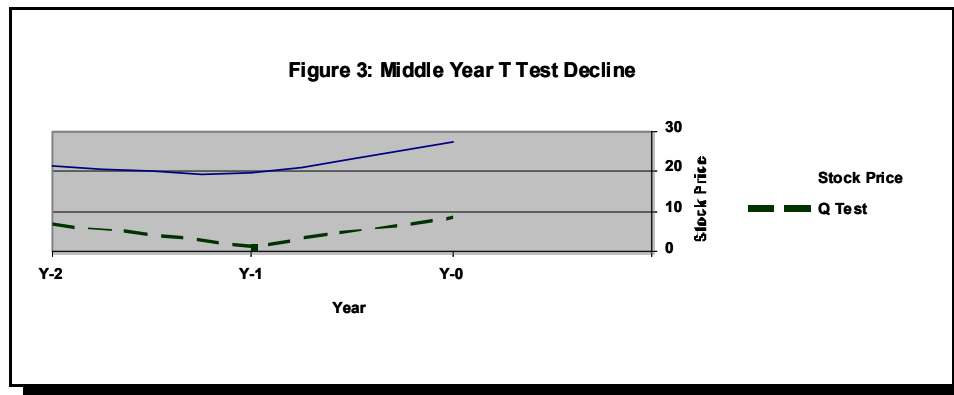
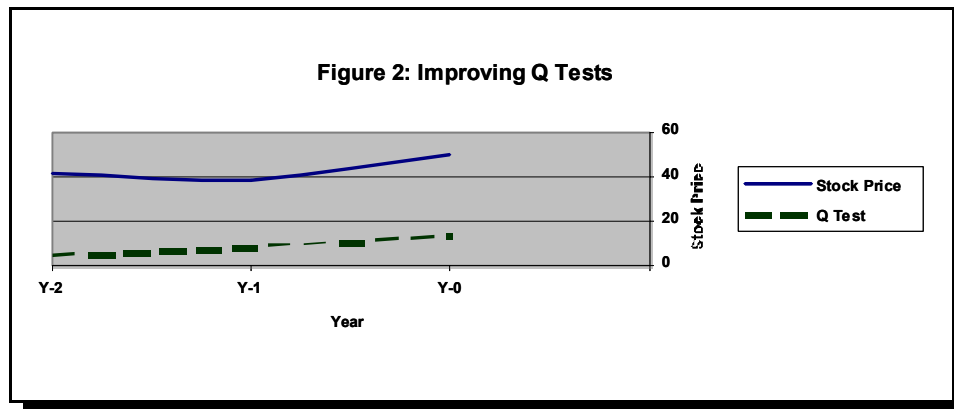
Analysis of Table 1 indicates trends that warrant six comments regarding the Q Test scores and stock price trends of the companies investigated in this study. First, evidently one of the most important characteristics the Q Test can possess appears to be consistency and, thus, lack of extreme variation. EBAY, Oracle, and Black and Decker show the most consistent Q Test scores over the three years analyzed. Their stock prices also showed greatest gains in each of the three years as can be seen in Figure 1.



Second, a constantly improving trend in Q Test Scores correlates positively with increasing stock price trends (Adobe, Wal-Mart, PepsiCo, and Ericsson). Ericsson had a very impressive Q Test improvement over the three years (-.62 to 7.82). Its stock price responded by moving from \$6.36 in year two to \$27.76 in year three. Refer to Figure 2 for a graphic comparison of average stock prices and Q Tests of these companies.

Third, the most common trend of Q Tests from the companies (seven) studied was a decline in year two followed by a subsequent increase in the year three (See Figure 3). The second year for most of the companies falls into the 2002-2003 era, the time when widespread corporate earnings management scandals were uncovered. This indicates that over one third of the companies in the sample had earnings quality deterioration at the same time the scandals were noted by the media.

From this observation one can reason that more companies were actually managing earnings than were caught doing so during this time. Interestingly, each of these seven companies showed stock price gains either over the three-year period or from year two to year three. This indicates improvements in Q Tests were followed by gains in stock prices.



Fourth, three companies (Microsoft, Acxiom, and Accredo) in the study showed significant increases in Q Tests in year two followed by declines in the year three. Microsoft's stock price increased in year two and then leveled off in year three. Acxiom's stock price declined in the year two, and then increased in year three. Accredo showed declines in its stock price in both year two and year three. Microsoft and Acxiom demonstrated healthy Q Tests for all years with little variation. However, Accredo showed low Q Test scores in year one and year three sandwiched around a very high score in year two. Here again, inconsistency plays a part in subsequently lower stock prices of the company.

The fifth observation concerns three companies (Nokia, Lexar, and Halliburton) with declining Q Tests in each of the three years included in the study. Nokia's stock price declined 67%



in year two, and then rebounded for a 45% gain in year three. Nokia's Q Test scores, even though they declined in each year, remained double digit healthy. This probably accounts for Nokia's ability to rebound to previous stock price levels in year three. Lexar's Q Tests gyrated from 3.28 in year one to 16.56 in year two and back to 4.98 in year three. The tremendous decline in its stock price from year two to year three is indicative of problems with its quality of earnings. Halliburton is another case for more intensive study. Stock prices increased by substantial amounts even though the Q Tests declined each year in the series. This appears to be a case where media releases and other extraneous market factors trump quality of earnings as stock price drivers. Halliburton's well publicized involvement in the Afghanistan and Iraqi Wars appears to have met with favor among investors.

Finally, something should be said about TyCo, International. TyCo's Q Test scores were low therefore indicative of low quality earnings for the three year period. The score declined from 2.63 to .297 from year one to year two, and then increased to 1.43 in year three. However, its stock price increased rather nicely from \$17.08 to \$20.73 to \$35.74 during the same time frame. Throughout the time the company received media attention for financial improprieties and other corporate misappropriations, its stock price remained solid. The possible explanation for this phenomenon could be TyCo's corporate strategy of diversification. TyCo's revelation of its corporate scandal to the public, unlike that of Enron and WorldCom, did not impair its financial soundness. This allowed them to weather a period of inferior quality earnings until they could get their house in order once again.

Results of research in this study endorse the following observations about Q Test measurements. First, anything below 5.0 indicates suspect quality of earnings. When one obtains a measurement at this level, it should lead to further investigation of the company involved to determine the quality of other reported financial information such as asset values and liabilities. Next, if the Q Test falls between 5.0 and 9.99, the financial analyst should accept the reported earnings as better than average quality. Finally, any Q Test over 10.00 (double digit) indicates superior quality earnings and, therefore, reported earnings can be relied upon as indication of true earnings and consequently true corporate growth.

## CONCLUSION

The Q Test that we propose in this article should help analysts discriminate between quality earnings and traditional bottom line earnings. Since earnings are primary stock price drivers and, accordingly, have been the object of various management schemes in recent years, it is important to develop a test such as the one we propose to detect such schemes early. The Q Test should be used to determine quality of reported earnings and not as a predictor of overall stock price movement. It is merely a tool that one can use to help evaluate investment potential of company stock. Other intangible factors such as general market movement, economic trends, and media

releases should continue to play important roles in investment strategies along with the Q Test analysis proposed in this article.

## REFERENCES

- Amernic, Joel H., and Sean Robb (2003). 'Quality of earnings' as a framing device and unifying theme in Intermediate Financial Accounting. *Issues in Accounting Education*. 18(1), February, 7-9.
- Branner, Laurie (2001). Auditor independence and earnings quality. *Business Finance*, December 7, 12.
- Brown, Paul R. (1999). Earnings management: A subtle (and troublesome) twist to earnings quality. *Journal of Financial Statement Analysis*, Winter, 4(2), 61-63.
- Eidleman, Gregory J. (1995). Z scores – a guide to failure prediction. *The CPA Journal on Line*. Retrieved February 15, 2005, from <http://www.nysscpa.org/cpajournal/old/16641866.htm>
- Krantz, Matt. (2002). Avoiding the next Enron: 'Low Quality' earnings can be helpful warning signs for investors. *USA Today*, February 1.
- Largay, III, James A. and Clyde P. Stickney (1980). Cash flows, Ratio analysis and the W. T. Grant bankruptcy. *Financial Analysts Journal*, July-August, 78-82.
- McClure, Ben (2004). Quality earnings count. *Investing*. March 11. Retrieved February 21, 2005, from <http://www.fool.com/news/commentary/2004/commentary040311ben.htm>
- Mills, J.R. and J.H. Yamamura (1998). The power of cash flow ratios. *Journal of Accountancy*, March. 53-61.
- Morgenson, Gretchen. (1999). Taking the shine off Lucent earnings. *New York Times-Market Watch*, April 11.
- Stickney, Clyde P., Paul R. Brown, and James M. Wahlen (2004). *Financial Reporting and Statement Analysis, 2e*. 157-167, 344.
- Wayman, Rick. (2003). How to evaluate the "Quality" of EPS. *Investopedia*. September 19. Retrieved February 21, 2005, from <http://www.investopedia.com/articles/analyst/03/091703.asp>

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.