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EARNINGS MANAGEMENT AMONG FIRMS DURING THE PRE-SEC ERA: A BENFORD'S LAW ANALYSIS

Abstract: This paper examines the existence of financial statement manipulation in the U.S. during a time period when many of the current motivations did not exist. The study looks for types of manipulations that would be motivated by the pre-SEC operating environment. To examine this issue, a sample of U.S. firms from the 1915 *Moody's Analyses of Investments* is divided into industrial firms, railroads, and utilities. The railroad and utility companies faced rate regulation during this time period, providing incentives to manipulate the financial reports so as to maximize the rate received. Industrial firms were not regulated. These companies wanted to attract investors, motivating manipulations to increase income and net assets. To determine if manipulations are occurring, a Benford's Law analysis is used. This analysis examines the frequency of numbers in certain positions within an amount to determine if the distribution of the numbers is similar to the pattern documented by Benford's Law. Some manipulations consistent with expectations are found.

Companies face incentives to choose accounting policies and estimates to achieve certain goals. Managers may want to smooth earnings, maximize earnings, or meet analysts' earnings forecasts. They may want to generate enough earnings to be able to issue dividends or to maintain their current or debt ratios to satisfy lending agreements. Earnings management is the process of choosing accounting alternatives to achieve desired accounting results. McKee [2005] stresses that earnings management uses legal methods as opposed to fraud. Managers may also engage in economic earnings management by making operating decisions designed to achieve desired accounting results.

Several authors have examined accounting policy choice to study earnings management. Many studies have focused on the choice of inventory cost-flow assumption [Morse and Richardson, 1983; Hunt, 1985; Johnson and Dhaliwal, 1988; Lindahl, 1989]. In general, these studies have found that companies choose the LIFO inventory cost-flow assumption if they face

high inflation in the cost of inputs, and also if they have certain accounting characteristics such as a high current ratio, low debt ratio, and/or large amounts of unrestricted retained earnings. These characteristics allow firms to continue with contracts that rely on accounting measures while using LIFO to reduce taxable income.

Other studies have modeled the accrual process and used the results to estimate abnormal accruals. These studies have then used abnormal accruals to examine a number of issues related to earnings management [Rees *et al.*, 1996; Cheng and Warfield, 2005; Peasnell *et al.*, 2005; Morsfield and Tan, 2006; Pincus *et al.*, 2007]

Another approach to examine earnings management is Benford's Law. Digits are not uniformly distributed in naturally occurring, unrestricted data. Instead, the first digit is much more likely to be small and much less likely to be large. For example, approximately 30% of the first digits will be one. This is thought to be due to the geometric growth of natural processes [Nigrini, 1999]. Manipulated data do not tend to follow Benford's Law. This occurs because people may overuse a favorite number, for example, or may tend to overuse large digits or the digit one in an attempt to overstate results. Benford's Law can then be used to detect fraud (Nigrini and Mittermaier, 1997; Carr, 2005; Cleary and Thibodeau, 2005; Johnson, 2005) or earnings management [Skousen *et al.*, 2004; Guan *et al.*, 2006, 2008; Jordan and Clark, 2011].

This study will examine the earnings management of U.S. company-reported data from the *1915 Moody's Analyses of Investments (Moody's)* using a Benford's Law analysis. This time period is being chosen because it is before the Securities and Exchange Commission (SEC) was created so that U.S. government regulation of securities did not exist. This time period is also before the existence of promulgated U.S. generally accepted accounting principles (GAAP) and modern auditing techniques. The study will examine what types of manipulation occurred in this environment and whether the manipulations are consistent with basic incentives to maximize the value of the firm. The analysis used is empirical which will extend the existing historical literature that is primarily based on conjecture and conventional wisdom. The sample of firms will be broken into industrial companies, which faced no U.S. federal governmental regulation, and railroads and utilities, which did have government-imposed rate regulations. By looking at these two groups of firms, the role of non-securities regulation can be examined

as a deterrent to financial statement manipulation.

Examining these issues will help the profession better understand the important role that securities' regulation does play in providing higher quality financial statements. It will also provide insight regarding the role of other forms of oversight of accounting practice and disclosures in improving reporting. Rate regulators in the railroad and utility industries are shown to provide some effective controls over certain types of financial statement manipulation, while the regulatory process seems to encourage other types of manipulations. Specifically, unregulated industrial companies primarily managed gross revenue, total net income, and payables. Regulated companies also managed payables. In addition, the regulated companies managed other income in the income statement and property, plant, and equipment, equity, and bonds payable in the balance sheet. These differential results between the groups studied indicate that pre-SEC regulatory actions did influence accounting choices.

The general conclusion that rate regulation did deter manipulation of operating revenues and operating income also has current ramifications. There are movements within the profession to increase oversight of reporting. The results presented here indicate that increased scrutiny of financial statements will lead to less manipulation in those areas under scrutiny, but can also encourage manipulation in areas not under scrutiny. Overall, this study contributes to our understanding of the importance of both securities-based and non-securities-based regulation on financial reporting and management incentives to manipulate those reports to achieve reporting goals or personal gain.

The next sections provide a discussion of the background for the study, a review of the literature, and development of hypotheses. These sections are followed by a discussion of the methodology. The results of the Benford's Law tests are then presented. The last section presents a discussion and conclusion.

BACKGROUND

Prior to the establishment of the SEC, financial reporting was not federally regulated in the U.S. While U.S. stock exchanges typically required financial statements for listed companies, GAAP were not well developed, and unlisted firms could trade on the exchanges as long as they provided a balance sheet [Sivakumar and Waymire, 1993]. The first published attempt at U.S. accounting standardization was "Uniform Accounts." issued April 1, 1917, in the *Federal Reserve Bulletin* [Tucker, 1987].

Full financial statement audits were not required for New York Stock Exchange (NYSE) listed companies until 1933 [Skinner, 1987]. Listing requirements, however, only applied to newly listed companies. As a result, 85% of listed companies had a full audit in 1933 [Gross, 2002]. The NYSE did have a listing requirement of a balance-sheet audit starting in 1910 [Sivakumar and Waymire, 1993]. Prior to 1917, the lack of promulgated accounting standards and minimal audit requirements created a situation that allowed firms to choose accounting policies to achieve desired results with fewer limitations than firms face today.

This study will use this time period, then, to examine whether managers took advantage of the lack of regulation and standardization to manipulate the reported financial information. To complete this investigation, the types of manipulations to look for need to be considered. This consideration needs to take into account the time period under study as the current types of manipulations seen in recent studies may not have been common in 1915 because, for instance, managers may not have had incentive contracts. Therefore, literature will be examined that is of both an historical nature and more current to consider what types of accounts may have been manipulated and the rationale for that manipulation.

The literature that is of an historical nature is used to give perspective on the way financial information was prepared and used. This provides insights on what types of accounts would most likely be manipulated. In reviewing the literature, the majority of papers with much depth regarding the preparation and use of financial information in the early 1900s are focused on the U.K. The literature on U.S. firms from this time period is both less substantial and less detailed. Therefore, the literature discussed in the next section will be for both U.S. and U.K.-based studies. While companies in these two countries did operate in different economic and regulatory environments, there were many similarities as well. Consideration of both reporting environments can provide indicators of the types of accounts that managers of the day may have manipulated.

LITERATURE

Accounting and Reporting in the U.K.: Laws in the U.K. established reporting and auditing requirements prior to the time period of this study. The Joint Stock Companies Act of 1844 required audited balance sheets [Morris, 1993]. This was the

earliest legislation requiring financial disclosure. Edwards [1992] notes that balance-sheet audits were mandatory by 1900. Legislation also standardized the reporting formats for railroads in 1868, gas utilities in 1871, and electric utilities in 1882. Therefore, there was considerably more observation and standardization of U.K. company reporting than U.S. reports at the same time. This increased audit oversight and reporting requirements may have led to less manipulation. Arnold [1998] does indicate that legislation prior to 1948 was inadequate for providing satisfactory disclosures and a reporting environment useful for those making capital-investment decisions. Thus, the reporting environment in the early 1900s, while more regulated than the U.S. at the same time, still lent itself to potential manipulation and reporting norms that would be more closely scrutinized under today's standards. The issues of interest in this literature are examples of how accounting and reporting were used to manage earnings and to provide insights into the types of accounts or statements where manipulation would most likely be found. These studies are non-empirical in nature, but they do provide useful insights regarding the belief of informed historians regarding where and why manipulations of financial reporting occurred.

Secret reserves were common in the U.K. These reserves were used to overstate financial position and to smooth earnings [Edwards, 1976; Arnold, 1991]. Companies often created reserves by overstating liabilities or depreciation during years of high income and then liquidating the reserves during lean years [Arnold, 1991].

Arnold [1998] examined internal information versus published statements for 30 U.K. companies between 1900 and 1924. His results indicate that prior to 1914, little manipulation of the statements occurred. From 1915-1924, his analysis documented manipulations of reported versus internal numbers. This manipulation was achieved through depreciation, taxation, and secret reserves, used by 25% of the companies after 1915.

As a result of the lack of audits and promulgated accounting standards, manipulation and omission were common in public financial statements in the U.K. Maltby [1998] noted that concerns over fraud and measurement uncertainty led to the Joint Stock Company legislation in Britain in the late 1800s. Lee [1975] indicated that the act of 1856 limited dividends paid to shareholders to reported earnings. This legislation also required annual balance sheets and statements of income. Bryer [1993] described the more widely owned corporations result-

ing from the merger wave at the turn of the 20th century in Britain as manager-controlled firms. In these entities, investors were seen as no more than loose constraints on management action. The accounting model that was developed at the time was easy for management to manipulate. Lee [1975] indicated that it was managers' opinion that shareholders only needed to know income so that they would be aware of the dividend to expect. Thus, income was manipulated through the use of secret reserves to allow for more conservative dividend payments to owners. Jones and Aiken [1994] also support the assertion that most of the income manipulation was used to stabilize dividend policy. The problem for investors in the early 20th century in the U.K. was not lack of disclosure as much as manipulation of and omissions in the statements provided. Without any reporting standards or regulations, what and how much to report was at the discretion of the Board of Directors.

Accounting and Reporting in the U.S.: Manipulation by American companies prior to the establishment of the SEC has been more infrequently studied than in the U.K. Merino and Neimark [1982] claimed, however, that financial statements were of poor quality and unreliable. Hawkins [1963] noted that during the 1920s, the Investment Bankers Association of America sought greater standardization of accounting information provided by industrial issuers. Statements were difficult to use for analysis because of a lack of standardization.

Johnson [1943] examined reporting of U.S. companies and found large charges and credits being made directly to surplus or reserves that should have been included in income, using a modern view of an all-inclusive income statement. Some charges were so large that they exceeded the reported income of the entity. Without standards to guide practice, what amounts went through reported income and what types of charges and credits went directly to surplus was at the discretion of management and the Board of Directors. For instance, Kern [2000] provided evidence that depreciation varied between good and poor years for companies between 1908 and 1930. This was an area of reporting that could easily be manipulated in an attempt to make the company look like a better investment prospect. Johnson [1943] noted that operating results generally did go through income, but nonoperating activity was inconsistently allocated between income and surplus.

Merino (1993) discussed the use of reserves to limit distributable income since it was common to pay all income as divi-

dends prior to 1920. These reserves were then used to regulate the amount of dividend payments and resulted in reported income manipulation to achieve the desired dividend distribution to shareholders. Thus, the condition of reporting in the U.S. was similar to that described by Bryer [1993] in Britain. Managers and the Board of Directors were free to adjust discretionary amounts such as depreciation, depletion, and reserves to report the income they wanted to report.

Rate Regulation in the U.S.: Public concern over rates in the late 1800s led to the regulation of railroads and utilities. The first laws were the Granger Laws established in the Midwestern states in the 1870s. These laws gave states the ability to regulate railroad rates [Ulen, 1980].

Rate regulation was typically based on cost plus a fair return on investment [Covaleski, *et al.*, 1995]. This provided regulated companies, such as railroads and utilities, an incentive to over-invest in assets in order to maximize the rate and, therefore, revenue. Boockholdt [1978] noted that the use of these return-on-invested-capital (ROIC) rate-setting regulations coincides in time with the increased use of the retirement method of depreciation and a trend toward capitalizing rather than expensing new assets. While he did not empirically test this relationship, the correlation between a regulatory change and a change in accounting policies seems to have clearly existed. These changes in accounting policies were such that it would tend to increase rates. These may not have been the only types of accounting changes made in response to rate regulation. This study seeks to determine if other efforts may also have been used by these regulated companies to manipulate the rate base.

Alternatively, the regulation process may have provided some scrutiny of the accounting process, reducing the ability of the managers to manipulate assets [Baskin, 1988; McKee, 2005]. The Interstate Commerce Commission (ICC) was established in 1887. The ICC devised an accounting system that served as a basis for examining revenues, expenses, and earnings of railroads and utilities so that fair rates could be established [Trebing, 1984]. These examinations may have acted to limit regulated companies' abilities to manipulate income. An example of such a limit would relate to property, plant, and equipment. If physical comparisons were made to accounting records, companies could no longer capitalize assets that were completely utilized in the current period since they would not be physically present to examine. Adequacy of depreciation would be an-

other possible item for regulators to examine through these laws that could have been highly manipulated without the regulatory oversight. As a result of these regulatory movements, accounting-rate-of-return-based laws existed in 29 states and the federal government by 1913 [Trebing, 1984]. The Hepburn Act (1906) empowered the ICC to establish a uniform chart of accounts for railroads [Ulen, 1980]. This uniformity in reporting would further reduce management's ability to manipulate earnings. Sivakumar and Waymire [2003] provide some empirical support for this lack of manipulation, reporting that railroads responded to accounting rules for fixed assets by adopting more conservative accounting policies to reduce earnings and, thereby, preventing lower rates rather than engaging in income-smoothing activities by adjusting maintenance expenses to counteract high or low revenue periods.

HYPOTHESES

The literature examined in the previous section seems to indicate that companies had the ability and incentive to manipulate income during the early 1900s. Incentives to manage earnings during that time period differ from incentives today. For example, fewer analysts followed firms in the early 20th century, so the need to meet analysts' earnings forecasts may have either not existed or been much less significant. However, since individual investors still had expectations, incentives existed to maximize or smooth earnings. The literature also indicates that incentives existed to manage earnings to satisfy dividend requirements or to remain attractive to lenders [Lee, 1975; Merino, 1993]. To help individual investors make decisions, *Moody's* issued stock and bond ratings. These ratings, in turn, were influenced by financial results. Thus, attracting investors would have been easier with higher net assets and income. The literature indicated that reserves were commonly used to accomplish this goal [Johnson, 1943; Edwards, 1976; Arnold, 1991; Merino, 1993]. This implies that the basic motive to improve the appearance of the company through "window dressing" existed in the pre-SEC environment as it does today.

Incentives to reduce income also existed. In 1909, the government passed an excise tax on corporate income of 1% of income in excess of \$5,000 [Previts and Bricker, 1994]. Thus, there were competing pressures on income manipulation to achieve different goals.

Audits were less frequent and less developed than today. Balance-sheet-only audits were a common practice, becoming

popular around 1910 [Gilman, 1939; Corcell, 1989]. Baskin [1988] noted that the lax standards of the day relegated accounting earnings to be a validation of dividend policy. The reporting environment was such that not all firms issued financial statements, and the statements issued varied greatly in the level of quality and quantity of detail provided [Brief, 1987]. A lack of standardized GAAP and less detailed audits created a situation where managers were able to make a greater number of accounting choices than today.

H1: Unregulated companies managed earnings and net assets to appear to be a more favorable investment.

However, as a result of rate regulation, railroads and utilities may have been less able to manipulate operating costs and earnings than unregulated companies. The regulated companies had an incentive not to appear too profitable in order to avoid rate reduction and/or increased regulation. Thus, the incentive in income manipulation may have been to reduce income through higher non-operating costs and deferring other income rather than increasing income as would be the case for most unregulated companies. Likewise, the increasing of reserves to hide excessive profit may also have been used. The regulated companies were receiving enough scrutiny; they did not want to attract more through the appearance of high profit margins.

Regulated companies had an incentive to manage assets to charge higher rates, but the regulatory environment left them unable to manipulate operating revenues. In this sense, regulators may have been providing an audit function with respect to some of the reported information of these regulated entities in the absence of actual financial statement audits.

H2: Rate-regulated companies managed net assets to increase the numbers to provide higher rates and only nonoperating components of earnings through income decreasing manipulations.

METHODOLOGY

This study examines earnings management among firms listed in the 1915 *Moody's Analyses of Investments*. This publication included data for 5,334 companies. A random sample of 810 companies was taken. Companies were eliminated if they were wholly owned subsidiaries (331), were incorporated outside the U.S. (10), were in receivership (1), or had no financial statements (141). This left a sample of 129 industrial companies (123 of which published an income statement and 128 of which

published a balance sheet), 89 railroads (82 of which published an income statement and 72 of which published a balance sheet), and 109 utilities (105 of which published an income statement and 92 of which published a balance sheet).

Earnings management may be operationalized in a variety of ways. Specific accounting policies are not disclosed in the 1915 *Moody's*. The average number of line items disclosed in the income statement was 4.33. With this lack of detail in the financial statements, estimating accruals would be too difficult. Therefore, earnings management is measured by whether the distribution of first digits in numbers conforms to Benford's Law.

Digits are not uniformly distributed in naturally occurring, unrestricted data. Instead, the first digit is much more likely to be small and correspondingly less likely to be large. This is thought to be due to the geometric growth of natural processes.

Benford postulated that first digits in naturally distributed data are distributed with probability equal to $\log(1+1/d)$, where d represents the digit and \log is the base 10 logarithm [Nigrini and Mittermaier, 1997]. The following chart provides the probability that the first digit of any number has the value given:

<u>Digit</u>	<u>Probability</u>
1	0.30103
2	0.17609
3	0.12494
4	0.09691
5	0.07918
6	0.06695
7	0.05799
8	0.05115
9	0.04576

Manipulated data do not tend to follow Benford's Law. This occurs because people may overuse a favorite number, for example, or may tend to overuse large digits or the digit one in an attempt to overstate results. Benford's Law can be used to detect fraud [Nigrini and Mittermaier, 1977; Cleary and Thibadeau, 2005; Carr, 2005; Johnson, 2005; Kelly, 2011] or earnings management.

Guan, *et al.* [2006] used Benford's Law to find that U.S. firms engage in cosmetic earnings management to achieve key reference points in each of the reported four quarters. The fourth quarter, which is audited, has less manipulation. Jordan and Clark [2011] reported that cosmetic earnings management decreased after passage of Sarbanes-Oxley. Skousen *et al.* [2004] and Guan *et al.* [2008] reported similar cosmetic rounding of reported earnings among Japanese and Taiwanese firms, respectively.

Lin *et al.* [2011] used Benford's Law to show that Taiwanese firms tend to report earnings in increments of 5 or 10. Zhou [2010] reported that using I/B/E/S, analyst forecasts that are in increments of 5 tend to be more optimistic and be accompanied by weaker stock-market responses.

Benford's Law analysis only utilizes information from one account unlike accounting policy choice or abnormal accrual estimation techniques which utilize information from other accounting choices or reported amounts. This focus on one account results in Benford's Law studies having less statistical power to detect earnings management. Only manipulations of one account significant enough and frequent enough to alter the distribution of digits can be detected. The other techniques can combine the changes in various accounts to detect manipulation rather than rely on adjustment to one account alone. However, Benford's Law can be tested on any set of data without the need to gather other information that may be difficult or impossible to identify, especially during the early 20th century when accounting was not as fully developed as it is today and when disclosure was less complete.

The actual distribution of first digits will be compared to the expected distribution with the goodness-of-fit test. The chi-square statistic was computed for the overall distribution. A second statistic was computed to measure firms' potential desire to manage size. Firms wanting to make an amount appear larger want to manage first digits up to the next 1 or 5. Firms wanting to make an amount to appear smaller would want to manage the first digit down to the previous 9 or 4 [Carslaw, 1988; Skousen *et al.*; Guan and Wetzel, 2004]. The second chi-square statistic compared the distribution of three sets of first digits: 1 or 5 (for line-item amount increases), 4 or 9 (for line item-amount decreases), and all other digits. In addition, the t-statistic was used to test the distribution of the digits 1, 4, 5, and 9 relative to Benford's Law.

Each line item in the reported financial statements was

gathered. Because of the lack of standards during this time period, there was considerable variation in the account titles given in *Moody's*. The authors combined only obviously similar items (such as cost of goods sold and cost of sales). If there was any doubt that a title represented something different than the titles already in use, the line item was added to the data base as a separately titled account. As a result, the data base used had 107 balance-sheet account titles and 48 income-statement account titles. The goodness-of-fit tests were conducted for each account title that had 20 or more observations in the sample. By examining items as reported, the Benford's Law test is being used appropriately by examining naturally occurring numbers. If line items were arbitrarily combined, the numbers being reported would no longer be naturally occurring numbers, and therefore, Benford's Law would not apply. The tests were separately conducted for unregulated industrial companies and rate-regulated companies.

RESULTS

Unregulated Companies: Table 1 presents the results of the goodness-of-fit test for the income statements of unregulated industrial companies. These companies were tested for gross revenue, gross earnings, operating expenses, depreciation, preferred dividends, dividends paid, fixed charges, total net income, balance, and final surplus. The overall goodness-of-fit test for total net income was significant with a probability 0.079. Gross revenue had a first digit of 1 or 5 more frequently than expected, though the frequency of the digit 5 did not achieve significance when considered individually. This result indicates that industrial companies had a tendency to report revenue in larger amounts than Benford's Law would expect. Interestingly, 17 of the 32 companies reporting net income had a first digit of 1, while none of the companies reported a first digit of 5. The chi-square test for the combined first digits is not significant. Still, the evidence suggests a tendency to report total net income that appears larger, moving into the next digit with a leading one.

TABLE 1
Goodness-of-Fit Tests
Unregulated Industrial Companies Income Statements

Statement Line Item	N	Distribution of 1 st digit	t-statistic				Distribution of 1 & 5, 4 & 9, and others
			Chi-square Probability	1	5	4	
Gross Revenue	46	0.271	1.82**	1.01	-0.48		0.035**
Gross Earnings	24	0.352	0.57	-0.30	0.12		0.833
Operating Expenses	32	0.404	0.72	-0.02	-0.96	-0.82	0.196
Depreciation	35	0.305	-0.72	-0.80	0.63	-0.89	0.968
Preferred Dividends	23	0.422	-0.19	-1.02			0.423
Dividends Paid	49	0.191	-0.08		-1.09	-1.19	0.085*
Fixed Charges	26	0.832		0.32		-0.65	0.872
Total Net Income	32	0.079*	2.65***	-1.33*	-0.36	0.88	0.151
Balance	50	0.616	0.14		-1.12	0.14	0.689
Final Surplus	82	0.634	-0.53		0.58	-0.13	0.756

* 10% Significance

** 5% Significance

*** 1% Significance

T-statistics are adjusted for the finite correction factor. Raw statistics less than 0.50 are omitted from the table.

The only other line item disclosed in the income statement to have a significant deviation from Benford's Law was dividends paid. The digits 4 and 9 were less likely than expected even though neither digit achieved significance individually. Reporting these digits less frequently than expected indicates a tendency to pay larger dividends than would be expected from a normal distribution of first digits even though the frequency of the digits 1 and 5 do not statistically indicate the tendency for larger dividend payments. This finding of inflated dividend payments is consistent with Lee [1975] who noted that the dividend policy of companies during this time period was to maximize the dividend paid to shareholders.

Table 2 presents the results of the goodness-of-fit tests for the balance sheets of unregulated industrial companies. The balance-sheet items tested were property, plant, and equipment; investments; inventories; bills receivable; accounts receivable; cash; common stock; preferred stock; bonded debt; bills payable; accounts payable; reserve; surplus; and total assets.

TABLE 2
Goodness-of-Fit Tests
Unregulated Industrial Company Balance Sheets

Statement Line Item	N	Distribu- tion of 1 st digit	t-statistic				Distribu- tion of 1 & 5, 4 & 9, and others	
			Chi-square Probability	1	5	4		9
Property, Plant, and Equipment	79	0.904	-0.80			0.70	-0.60	0.644
Investments	28	0.736	-0.38				0.20	0.764
Inventories	38	0.717	0.35	-0.31	1.54*			0.190
Bills Receivable	30	0.567	0.58	0.08	-0.25	0.11		0.612
Accounts Receivable	64	0.423	-1.84**	0.25	0.54	-0.85		0.342
Cash	93	0.423	-0.79	1.20	1.57*	0.62		0.114
Common Stock	100	0.105	-2.31**	2.44***	0.61	-0.51		0.708
Preferred Stock	48	0.017**	-0.30		0.41	-1.17		0.826
Bonded Debt	39	0.426	-1.13		0.93			0.340
Bills Payable	30	0.634	-1.41*	0.76	-0.25	0.11		0.597
Accounts Payable	58	0.057*	-1.42*	-0.53	2.17**	1.79**		0.003***
Reserves	34	0.561	0.47	1.15	-1.04	-0.05		0.218
Surplus	90	0.406	-0.14	-1.03		-0.82		0.441
Total Assets	104	0.010**	-0.17	-0.99	-0.19	0.82		0.656

* 10% Significance

** 5% Significance

*** 1% Significance

T-statistics are adjusted for the finite correction factor. Raw statistics less than 0.50 are omitted from the table.

Unregulated industrial companies had a tendency to understate accounts payable. This is indicated by the significance of both the first digit distribution as a whole and the distribution of 1, 4 and 9, and other numbers relative to 1 and 5 and 4 and 9. The direction of the distribution is determined by the t-statistics of each number. These t-statistics show that the digits 4 and 9 were both significantly more common, and the number 1 was less common than expected by Benford's Law. One was also less common for bills payable. However, the other results from accounts payable were not replicated for bills payable.

Some evidence of earnings management behavior is demonstrated among current-asset accounts. Both the inventory and cash accounts show the number 4 being the first digit more often than expected. For accounts receivable, 1 is a first digit less often than

expected. Surprisingly, in each case, the company manipulated the reported balance to make the account appear smaller than a distribution of numbers consistent with Benford's Law would look.

The equity accounts also had deviations from the distribution of first digit numbers that would be expected under Benford's Law. In the common-stock account, 1 is less common and 5 is more common than expected. These results are opposite each other since the frequency of both 1 and 5 indicate an increasing manipulation effect [Carslaw, 1988; Skousen *et al.*, 2004]. Both the chi-square statistic for the first digit as a whole and for the groupings of 1 and 5, 4 and 9, and all other numbers are insignificant for common stock. Thus, the intent of the manipulation with common stock is unclear.

The overall distribution of first digits is significantly different from expected for the preferred-stock account. However, the other reported statistics do not show a significant deviation from the expected distribution. The only digits that showed significance were 2 (t-statistic of 3.42) and 6 (t-statistic of 1.57).

Total assets also show a similar result. The overall distribution of first digits significantly differs from Benford's Law as shown by the significance of the overall chi-square result. However, the only other significant differences from the expected distribution were for 2 (t-statistic of 2.01), 6 (t-statistic of 2.17), and 8 (t-statistic of 2.75). These numbers were all more common than expected and do not represent increasing or decreasing tendencies. A total would also be difficult to manipulate since it is the sum of previous numbers. Therefore, the significant result found here is probably not related to manipulation.

Regulated Companies: Table 3 presents the results of the goodness-of-fit tests for the income statement of regulated companies. The income statement line items tested for these companies were gross revenue, operating expenses, tax accrued, depreciation, other income, preferred dividends, dividends paid, fixed charges, total net income, balance, and final surplus. The lack of significance in the overall goodness-of-fit test for net income indicates that the distribution of first digits is consistent with Benford's Law. This suggests that the regulatory process provided enough scrutiny over reporting to discourage earnings management of net income. Significant deviations were found, however, in components of the income statement. The first digit of tax accrued was less likely to be 1 and more likely to be 9 than expected. This result indicates a tendency to understate this expense even though neither the chi-square statistic for the distribution of first digits as a whole nor the chi-square tests

considering 1 and 5, 4 and 9, and all other numbers were significant. This manipulation of taxes is consistent with the findings of Arnold [1998], who reported that taxation was one of three reported numbers that differed from internal data in his analysis of U.K. companies during a similar time period.

TABLE 3
Goodness-of-Fit Tests
Regulated Company Income Statements

Statement Line Item	N	Distribu- tion of 1 st digit	t-statistic				Distribu- tion of 1 & 5, 4 & 9, and others
			Chi-square Probability	1	5	4	9
Gross Revenues	158	0.671	-0.70	-0.59		-0.66	0.309
Operating Expenses	165	0.747	0.82	-0.16	0.92	-0.39	0.571
Tax Accrued	36	0.438	-1.58*	0.40		1.48*	0.394
Depreciation	29	0.747		0.83	-0.19	0.15	0.740
Other Income	53	0.059*	0.46	-1.88**	2.03**	1.36*	0.089*
Preferred Dividends	25	0.123		1.13	0.52		0.490
Dividends Paid	71	0.195		-0.93	-0.96	0.14	0.460
Fixed Charges	116	0.959		-0.24	-0.86		0.554
Total Net Income	44	0.234	-0.57	0.01		-1.09	0.413
Balance	59	0.291	-0.36	-0.56	0.78	-0.12	0.624
Final Surplus	137	0.114	-0.70	0.21	-1.96**	0.50	0.235

* 10% Significance

** 5% Significance

*** 1% Significance

T-statistics are adjusted for the finite correction factor. Raw statistics less than 0.50 are omitted from the table.

Other income tended to be understated as indicated by the digits 4 and 9 being more common and 5 less common than expected. Both the chi-square statistic for the first digit as a whole and the chi-square statistic for frequency of 1 and 5, 4 and 9, and other digits were significant. These chi-square results show that reported other income fails to follow the pattern of first digits expected from Benford's Law. Combined with the t-test result for the numbers 1 (being too few) and 9 (being too frequent), the conclusion can be drawn that regulated companies attempted to minimize the affect of other income on total net income. This is consistent with attempting to appear not any more profitable than necessary to avoid rate reduction.

The only other significant result in the income statement of regulated companies was that the digit 4 in final surplus was less com-

mon than expected. This indicates that regulated companies made some attempt to make retained income appear larger. However, the test for increased frequency of the number 5 was not significant.

Table 4 presents the results of goodness-of-fit tests for the balance sheets of regulated companies. The account balances tested for these companies were property, plant, and equipment; investments; bills receivable; accounts receivable; supplies and materials; cash; common stock; preferred stock; bonded debt; notes payable; accrued liabilities; bills payable; accounts payable; current liabilities; reserves; surplus; and total assets.

TABLE 4
Goodness-of-Fit Tests
Regulated Company Balance Sheets

Statement Line Item	N	Distribution of 1 st digit Chi-square Probability	t-statistic				Distribution of 1 & 5, 4 & 9, and others Chi-square Probability
			1	5	4	9	
Property, Plant, and Equipment	82	0.348	-1.97**		1.33**	0.92	0.043**
Investments	30	0.281	-0.61	-0.59	0.37	0.11	0.385
Bills Receivable	33	0.207	-0.54		-0.41		0.733
Accounts Receivable	48	0.864	1.27		-0.29	-0.48	0.275
Supplies and Materials	64	0.330	0.88	0.66	-0.72		0.329
Cash	92	0.809	0.64	-0.30	0.56	-0.35	0.833
Common Stock	97	0.014**	0.51	2.56***	-1.00	-1.43*	0.041**
Preferred Stock	48	0.106	1.59*	-0.25	-2.03**	0.90	0.370
Bonded Debt	79	0.071*	-0.80	-0.31	1.08	1.55*	0.085*
Notes Payable	27	0.209	-0.26	-0.45	-0.08	-0.68	0.258
Accrued Liabilities	27	0.360	1.00	-1.17	-0.08		0.886
Bills Payable	28	0.507		0.20	1.78**	0.20	0.066*
Accounts Payable	32	0.783			0.84	0.03	0.358
Current Liabilities	30	0.120	0.021		-0.25	-0.76	0.311
Reserves	45	0.272	-1.96**		0.57	0.31	0.150
Surplus	76	0.300	1.16	-1.07	1.60*	-0.54	0.399
Total Assets	103	0.069*	-2.04**	0.13	1.84**	2.26**	0.004***

* 10% Significance

** 5% Significance

*** 1% Significance

T-statistics are adjusted for the finite correction factor. Raw statistics less than 0.50 are omitted from the table.

Similar to unregulated companies, the digit 4 was more common than expected in bills payable. This result was also found in the chi-square statistic for the digits 4 and 9. The digit 9 was also more common than expected in bonded debt. Both the chi-square for the entire first digit and the chi-square for the 1 and 5, 4 and 9, and all other digits were significant as well. Taken together, these results indicate that regulated companies had a tendency to report bills payable and bonded debt as smaller amounts than would be expected within Benford's Law.

For property, plant, and equipment, the digit 1 was less common and the digit 4 more common than would be expected given Benford's Law. The common occurrence of these digits indicates a tendency to reduce the size of the property, plant, and equipment account balance shown. This result is also confirmed in the chi-square statistic for the combined distribution of 1 and 5 and 4 and 9, which is also significant. This balance-reducing behavior may seem opposite the incentive provided by regulated rates which would seem to encourage overinvestment in assets. This result is also opposite the expected result of changes in accounting policy noted by Bookholdt [1978]. However, companies may have been manipulating downward to reduce scrutiny by the regulators and appear more efficient by using fewer assets to generate the revenue that they actually generated.

The equity accounts show clearer evidence of numeric manipulation than in the case of the unregulated companies. In common stock, 5 was more common and 9 less common than expected. Both the chi-square for the first digit as a whole and the chi-square for the combined distribution of 1 and 5, 4 and 9, and all other numbers were significant. These results all consistently point to a tendency to report larger common stock balances than would be expected. For preferred stock, 1 was more common and 4 less common than the expected Benford's Law distribution. However, for the preferred stock, neither the chi-square for the first digit distribution nor the distribution for 1 and 5, 4 and 9, and all other numbers was significant. The individual number results again point to balance-increasing manipulations. These results indicate that regulated companies were consistently inflating the capital-stock balances on their balance sheets. For any given amount of income, higher equity balances would result in lower return on equity. This result could have given regulated companies some leverage for obtaining higher rates to ensure a better return for their capital providers. By decreasing bonded debt, which was shown in this table as well, the portion of financing provided by equity

providers is also maximized. Thus, the managers could inform regulators that if adequate return is not given to their shareholders that the regulated entities will be unable to attract additional capital and grow. The companies may have chosen equity as the place to manipulate because it was scrutinized to a lesser extent than either income or fixed assets. The ICC examined revenues, expenses, and earnings [Trebing, 1984] and physical assets are clearly visible. However, the balances of capital stock were not considered in the legislation or policies for rate regulation and would be more difficult for regulators to monitor. Merino [1993] points out that watered stock was common in the early 20th century. The increasing account-balance manipulations detected in this study seem to give empirical weight to this contention.

Reserves showed a lower than expected number for the digit 1, but this was the only significant result for reserves. The digit 4 was more common than expected for the surplus balance. Both of these results again indicate a reducing effect on total equity.

Total assets have significantly fewer first digits as number 1 and significantly more first digits 4 and 9 than would be expected under Benford's Law. For total assets, both the chi-square for the distribution of first digits and the chi-square for the distribution of 1 and 5, 4 and 9, and all other digits were significant. Thus, total assets appear to be manipulated in a downward direction. This is inconsistent with the hypothesis that rate-regulated entities would increase their asset base to raise rates. However, regulatory scrutiny and pressure may have actually encouraged the companies to reduce these numbers.

DISCUSSION AND CONCLUSION

Table 5 summarizes the results described in the previous section along with indicating the hypothesized manipulation. A line item was considered for inclusion in this summary table when there were two significant results in a consistent direction in the previous tables. Section A of Table 5 considers the unregulated industrial companies. The results found were highly consistent with the hypothesis that these companies would manipulate income and net assets to appear to be a better investment prospect. The results indicate that companies tended to increase gross revenues leading to increased total net income. *Moody's* [1915] and other investment services did provide investment ratings for companies, and these ratings related to income. Therefore, manipulating income in an upward direction would result in a better investment rating and the ability to attract increased capital at a lower cost. The income-statement manipu-

lations found were then consistent with company incentives. Likewise on the balance sheet, a safer company is one with higher net assets. The results again supported this hypothesis with significant decreases in accounts payable observed.

TABLE 5
Summary of Results

Section A			
Unregulated Companies	Hypotheses	Significant Account	Direction of Manipulation
Income Statement			
Revenues	Increasing	Gross Revenue	Increasing
Expenses	Decreasing	NA	
Totals	Increasing	Total Net Income	Increasing
Balance Sheet			
Assets	Increasing	NA	
Liabilities	Decreasing	Accounts Payable	Decreasing
Equity	Increasing	NA	
Section B			
Regulated Companies			
Income Statement			
Operating Revenues	NA	NA	
Nonoperating Revenues	Decreasing	Other Income	Decreasing
Operating Expenses	NA	NA	
Nonoperating Expenses	Increasing	Accrued Taxes	Decreasing
Totals	Decreasing	NA	
Balance Sheet			
Assets	Increasing	Property, Plant, and Equipment	Decreasing
		Total Assets	Decreasing
Liabilities	Decreasing	Bills Payable	Decreasing
		Bonded Debt	Decreasing
Equity	Increasing	Common Stock	Increasing
		Preferred Stock	Increasing

Section B of Table 5 summarizes the results for the regulated companies. On the income statement, it was expected that only nonoperating items would be manipulated as the regulators scrutinized operating revenues and expenses. This expectation was confirmed by the results. Nonoperating revenues were manipulated downward to show lower profits. However, accrued taxes were actually manipulated in a downward direction which increases income. The manipulation of nonoperating revenues is logically related to rate setting in the regulated environment. However, the manipulation of taxes may have been more mo-

tivated by manipulations to attract investors. These regulated companies do not want to increase income much to reduce rates and increase regulation by being too profitable, but showing lower payments for taxes may be a way to indicate to investors that the company is trying to control costs.

Since rates were often influenced by accounting-rates-of-return, rate-regulated companies would have an incentive to increase net assets to convince regulators that higher rates are needed. The results were consistent with this expectation with respect to liability and equity manipulations. However, property, plant, and equipment showed a decrease rather than the expected increase. This result may not be completely inconsistent if regulators did examine the operating-asset base as part of their evaluations. The reduction of property, plant, and equipment would make the company look more efficient with its use of assets and place the company in higher regard with the regulators. While neither the depreciation or operating-expenses accounts showed signs of manipulation, if the companies were expensing assets rather than capitalizing them or recording higher levels of depreciation, deliberate decreases in operating assets would be associated with lower income which is consistent with the rate-increasing goal. The significant decrease in property, plant, and equipment, then, could have been accomplished with some manipulations to both depreciation and operating expenses so that the statistically significant effect in property, plant, and equipment was spread between two other accounts, making the manipulations to the expense accounts more difficult for Benford's Law to detect.

The manipulations observed with debt and equity accounts are highly consistent with achieving the rate-increasing goal. The asset base must be financed through either debt or equity. By showing lower debt balances, the company indicates to regulators a higher reliance on equity financing. This not only appears safer but also decreases the return-on-equity measure which would lead regulators to a conclusion that higher rates are needed for this well run, safe utility or railroad. Thus, these manipulations together are highly encouraged by the way regulators set rates.

The results taken as a whole for the rate-regulated companies indicate that these companies responded to the regulatory environment extremely well. No manipulations were found in the operating-income accounts which regulators scrutinized. The manipulations found, however, are highly consistent with actions that could maximize rates given the system used to set

rates. Thus, as with manipulations found in current reporting, rate-regulated companies were examining incentives set up by regulators and manipulated accounts to get the highest return for shareholders.

Because of less oversight, the original expectation was that more accounts would be manipulated by unregulated entities. This ended up not being the case. The regulated companies were documented to manipulate eight different line items on financial statements while unregulated companies were shown to manipulate only three line items. The increased manipulation by regulated companies actually may have been encouraged by the regulation. The regulated companies were aware of what the regulators looked at and how the regulators determined the need for rate increases. This knowledge provided companies with the information needed to work within the regulations to try to increase rates. The unregulated companies lacked regulatory scrutiny and were, therefore, able to manipulate any accounts they wanted to achieve goals of higher income and net assets. As a result, the unregulated companies may have manipulated different accounts to achieve the higher income/net assets appealing to shareholders. Benford's Law looks at a whole set of numbers to find manipulation rather than just the number for one company. Therefore, if a few unregulated companies were manipulating each account, the technique used in this paper to detect the manipulations would not find any distortions in the reported data. The accounts found to have significant manipulation were accounts that are high profile in conducting analysis; revenues and net income are highly referenced numbers in analysis. Thus, the significant manipulation was to accounts that investors would likely use to assess the company directly rather than to accounts that would accomplish the higher income goal less directly. The regulated companies could not manipulate these high-profile accounts because they were being scrutinized by regulators. Therefore, to accomplish the same goals, the regulated companies had to manipulate lower-profile accounts, which, because of lower dollar value, may have necessitated multiple manipulations. These issues taken together explain the relative frequency of accounts being manipulated between the regulated and unregulated samples.

The conclusion that regulated companies did not manipulate operating revenues and expenses is also important. These were the accounts scrutinized by regulators. By failing to find manipulation in these accounts for regulated companies but finding manipulation of gross revenues and net income by un-

regulated companies during the same time period, this study demonstrates that regulatory scrutiny did seem to influence behavior of company officials.

Another limitation of using Benford's Law to investigate the existence of financial-statement manipulations is that it provides no evidence of how the manipulations occur. The amount of the likely manipulation is not determined by a Benford's Law analysis. Analysis using other techniques would be needed to answer these questions.

The analysis in this study did show results that are consistent with the assertion that regulated and unregulated companies managed reported results and did so in different ways. The only common area of manipulation was current liabilities. While unregulated companies manipulated revenue and income, regulated companies were more likely to manipulate amounts in non-value maximizing ways and did so in accounts that were more difficult to verify. This suggests that the regulatory process provided some scrutiny of results and did influence the types of manipulations made. Examining the pre-SEC, pre-audit, pre-promulgated accounting standards era indicates that incentives did exist for manipulation and that financial-statement manipulation did exist consistent with those incentives. Therefore, the results indicate that to reduce financial-statement manipulation in the past as well as today, either incentives for manipulation need to be reduced and/or greater oversight with respect to what is reported is needed. This confirms the importance of examining the incentives implicit in both private contracts and public regulations.

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