

An Evaluative Study of Financial Fraud Using Benford Law

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Abstract: According to past researches (Nigrini, 2012) Accounting data, in general, has a remarkable conformity to Benford's Law; however, it is still an unsolved question whether accounting numbers from companies conform the Benford law and is Benford law providing the auditor with a tool which is effective and simple for the financial fraud detection. In this paper researcher has made an attempt to check the conformity of financial statement of selected sample private company and shell company. The secondary data of two companies for 6 years from the year 2011-12 to 2015-16 has been used for analysis. The result shows that in case of first company i.e. Grameen Financial Services Pvt Ltd there is no significant deviation between observed frequencies and Benford distribution. On the other hand, significant deviation was observed in case of the second company i.e. G V Film Ltd (shell company).

Keywords: Financial Statement, Financial Fraud, Benford law, Shell Companies

1. Introduction

1.1 Forensic Accounting

ACFE (2012) defines forensic accounting as follows:

Forensic accounting is the use of professional accounting skills in matters involving potential or actual civil or criminal litigation, including, but not limited to, generally acceptable accounting and audit principles; the determination of lost profits, income, assets, or damages; evaluation of internal controls; fraud; and any other matter involving accounting expertise in the legal system.

Forensic accounting is broader than fraud examination (Hopwood, Leiner & Young, 2008:4). Fraud examination is similar to the field of forensic accounting in some aspects, but these two concepts are not exactly equivalent. Forensic accounting is not limited to fraud, but also includes bankruptcy, business valuations and disputes, divorce, and a multitude of other litigation support services (Wells, 2008:4).

Brennan and Hennessy's (2001:5-6) definition of forensic accounting highlights the following aspects:

- Integrating accounting, auditing and investigative skills and applying litigation;
- Applying financial expertise to financial investigation;
- Applying financial expertise to legal problems, disputes and conflict resolution;
- Describing expert specialist accounting work conducted for court or other legally sensitive purposes;
- Gathering information and providing an account analysis to determine the facts necessary to resolve a dispute;
- Performing an orderly analysis, investigation, inquiry test, inspection or examination, or any combination of financial information, in an effort to assess the merits of a situation and form an expert opinion.
- Looking behind and beyond, rather than merely at the numbers;
- Performing work with a view to its potential use in a legal environment; and

- Not contesting in cases, but conducting evaluations, examinations, and inquiries and reporting findings in an unbiased, objective and professional manner.

1.2 Fraud

Fraud can be defined in various ways, and each definition addresses a different element of the concept. A general meaning of fraud from Oxford Dictionaries (2012) is a "wrongful or criminal deception intended to result in financial or personal gain".

Financial statement fraud is deliberate misrepresentation, misstatement or omission of financial statement data for the purpose of misleading the reader and creating a false impression of an organization's financial strength. Public and private businesses commit financial statement fraud to secure investor interest or obtain bank approvals for financing, as justification for bonuses or increased salaries or to meet expectations of shareholders. Upper management is usually at the center of financial statement fraud because financial statements are created at the management level.

Five basic types of financial statement fraud exist:

- Fictitious sales
- Improper expense recognition
- Incorrect asset valuation
- Hidden liabilities
- Unsuitable disclosure

Financial statement red flags provide a general overview of the warning signs investors should take note of. They do not necessarily indicate an occurrence of financial statement fraud, but merely signal that further in-depth research must be conducted to assess the validity of the corporate documents. Creditors would find such information useful to ensure that loans are not provided to firms operating with an elevated amount of risk.

Spotting red flags can be extremely challenging as firms that are engaged in fraudulent activities will attempt to portray the image of financial stability and normal business operations. Due to this reason, a specialized branch has

emerged, known as Forensic Accounting. Forensic Accounting is a Scientific Accounting method of uncovering, resolving, analysing and presenting fraud and related matters in a manner that is acceptable in the court of law (Oyedokun 2013). The integration of accounting, auditing and investigative skills yields the specialty known as Forensic Accounting. Forensic Accounting thus provides an accounting analysis that is suitable to the court which will form the basis for discussion, debate and ultimately dispute resolution. Forensic Accounting encompasses both Litigation Support and Investigative Accounting.

1.3 Benford Law

Benford law is one the simple and effective tool for identifying the likelihood of manipulation in financial statement. It is named after physicist Frank Benford who stated it in 1938, although it had been previously stated by Simon Newcomb in 1881. Benford's law, also called Newcomb Benford's law and first digit law, is an observation about the frequency distribution of leading digits in many real-life sets of numerical data. The law states that in many naturally occurring collections of numbers, the leading significant digit is likely to be small.

1.4 Shell Corporation

A shell corporation is a corporation without active business operations or significant assets. These types of corporations are not all necessarily illegal, but they are sometimes used illegitimately, such as to disguise business ownership from law enforcement or the public. Legitimate reasons for a shell corporation include such things as a startup using the business entity as a vehicle to raise funds, conduct a hostile takeover or to go public.

However, the tax avoidance is sometimes seen as a loophole to tax evasion as these corporations have been known to be used in black or gray market activities. It's natural to be suspicious of a shell corporation, and it's important to understand the various scenarios in which they arise.

2. Literature Review

Lin et. al. (2012)^[4] stated that corporate fraud significantly increases the external financing cost. They also found that fraudulent firms retain more cash to better cope with adverse shocks. Consistent with the precautionary motive argument, shareholders and outsiders value more for an additional dollar of cash after corporate fraud. Additionally, they document that corporate fraud contributes to financial constraints by finding that fraudulent firms save more cash out of cash flow.

Brazel et. al. (2009)^[5] investigated that whether comparing financial data to nonfinancial measures (NFMs) can aid auditors and others in assessing fraud risk. They predict and found that fraud firms have greater differences in percent change in revenue growth and percent change in NFMs than their non-fraud competitors. These differences are positively associated with fraudulent financial reporting after controlling for variables that have been previously linked to fraud.

Piskorski et.al. (2013)^[6] stated that the propensity to misrepresent loans is pervasive among reputable firms and is largely unrelated to underwriter level measures such as incentives for top management or quality of risk management inside these firms should not be taken to imply that the quality of lending and intermediation is unrelated to these factors. They explored the relation between the extent of misrepresentation and the equilibrium level of these factors in the data.

Durischi et. al. (2004)^[1] stated that Benford Analysis when used, correctly is a useful tool identifying suspect accounts for further analysis. They further stated Benford law by itself might not be "surefire" way to catch fraud, it can be a useful tool to help identify some accounts for further testing and therefore should assist auditors to detect misappropriation in figures of financial statement.

Geyer (2010)^[3] concluded that the results of the experiment indicated that the distributions of random numbers guessed by people share some properties with the Benford distributions such as the frequency of numbers with first significant digit 1 is much higher than expected and the frequency of numbers with first significant digit 8 or 9 is much lower than expected. These conclusions are consistent that generally high numbers are less likely to be chosen in numbers.

ArbenAsllani et.al. (2014)^[2] stated that Benford law when used properly, the proposed approach can significantly save auditing time and other resources by allowing the auditor to focus only in more specific areas of accounting records to fulfill the fraud detection responsibility.

Research Gap

Noor very few significant research work has been undertaken by considering Shell Corporation. And hardly used models to detect financial data fraud. The present study attempts to bridge this gap.

3. Research Methodology

3.1 Problem Statement

In the era of information the potential of financial fraud is wider in scope. Consequently, new tool and technique such as forensic accounting is presented to combat the financial fraud. Benford is one of the forensic accounting technique. And there are very few research studies for financial fraud has been done by considering Shell Corporation. And hardly used models to detect financial data fraud. That is why this problem is selected for this study.

3.2 Objective of the study

The study was undertaken with the objective of checking conformity of the data taken from the financial statements of the selected companies with the Benford's Law Distribution.

3.3 Sample Selection

In order to undertake this study, the data of two listed companies was taken. The data of the following companies was considered for the purpose of the study.

- (1) Grameen Financial Services Pvt Ltd
- (2) G V Film Ltd

3.4 Data Source

The study is based on the data collected from secondary sources by using annual reports. Financial Report of six years i.e. 2011-12 to 2015-16 of selected companies is used for undertaking the analysis.

3.5 Research Tool

For the purpose of analysis of financial statement Benford Law, one of the forensic accounting technique is used. First Digit Test has been applied specifically. And to check variability statistical technique Mean Absolute Deviation, graph and chi-square is applied.

3.6 Hypothesis

From the view point of financial fraud investigations, a significant difference between the actual and expected frequencies of Benford's Law could be an indication of a fraud.

Ho: Observed frequency distribution follow the expected distribution

H1: Observed frequency distribution do not follow expected distribution

Benford's Law, also called Newcomb-Benford's law and first-digit law, is an observation about frequency distribution of leading digits in many real-life sets of numerical data. The law states that in many naturally occurring collections of numbers, the leading digits is likely to be small. For example, in sets that obey the law, the number 1 appears as the most significant digit about 30% of the time, while 9 appears as the most significant digit less than 5% of the time. By contrast, if the digits were distributed uniformly, they would each occur about 11.1% of the time. Benford's law also makes predictions about the distribution of second digits, third digits, digit combinations, and so on. The probability that a number has a first digit, d, is:

$$P(\text{the first digit is } d) = \text{Log}_{10}(d+1) - \text{Log}_{10}(d), \text{ where } d = 1, 2, 3, \dots, 9$$

This equation gives us the theoretical distribution of what is now commonly referred to as Benford's Law, or the expected frequency of the first digits 1 through 9. And the distribution resulting from this equation is:

Table 1: Benford Frequency Distribution for First digit

Digit	Firstplace
1	0.301
2	0.1761
3	0.1249
4	0.0969
5	0.0792
6	0.0669
7	0.058
8	0.0512
9	0.0458

The graph here shows Benford's law. There is a generalization of the law to numbers expressed in other bases, and also a generalization from leading 1 digit to leading n digits.

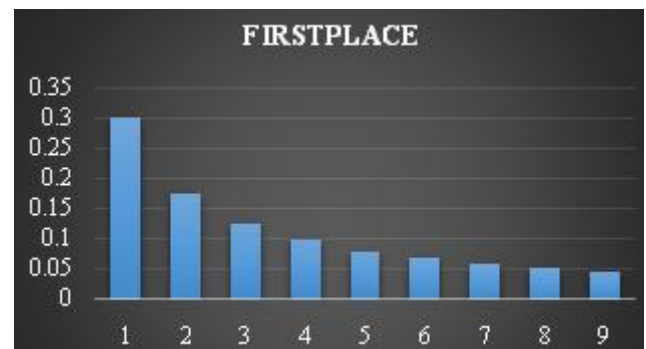


Figure 1: Benford Law Frequency Distribution for first digit

3.7 Limitation of Study

- 1) The source of data is secondary in nature and hence whatever deficiencies are there in secondary data the same will reflect in the results of the study.
- 2) The technique used for study is based on certain assumption may not be relevant to the selected companies or situations.
- 3) The technique has certain limitations and the same are applied to this study also.
- 4) The study is restricted to the variable used as sample for analysis.

4. Data Analysis

4.1 Grameen Finance Pvt Ltd

Table 2: Result derived by applying Benford Law for Grameen Finance Pvt Ltd

igit	Expected Value	Actual Value	Absolute Difference
1	0.301	0.2678	0.0332
2	0.1761	0.2857	0.1096
3	0.1249	0.119	0.0059
4	0.0969	0.0773	0.0196
5	0.0792	0.0714	0.0078
6	0.0669	0.0416	0.0253
7	0.058	0.0595	0.0065
8	0.0512	0.0476	0.0036
9	0.0458	0.0297	0.0161
		MAD	0.020496296
		Chi-square	14.96

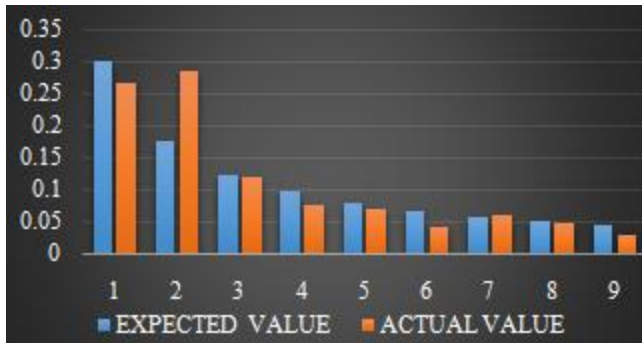


Figure 2: First digit frequency distribution of Grameen Finance Pvt Ltd

Analysis

In the above table the theoretical frequencies of the Benford’s law are compared with the observed frequencies. First row shows the Benford’s law frequency distribution. Second row shows the observed frequencies. Result of case study analysis shows that fabricated data does not conform to expected theoretical frequencies. Further statistical tool MAD is calculated to check the variation in observed frequencies. The higher the MAD, the larger the average difference between the actual and expected proportions. For the First Digits MAD values above 0.015 signal Nonconformity(Ikbale TOTA,2016). Though (figure 2) company showed several peaks and troughs, indicating deviation from the Benford frequency distribution. But the calculated MAD shows breaches the cut-off value. The calculated value of the Chi-Square statistic is 14.96 which is less than the critical value of 15.507 at the 5% level of significance and 8 degrees of freedom. This indicates that the null hypothesis “Observed frequency distribution follow the expected distribution” can be accepted.

4.2 G V Film Ltd

Table 3: Result derived by applying Benford Law for G V Film Ltd

Digit	Expected Value	Actual Value	Absolute Difference
1	0.301	0.3416	0.0406
2	0.1761	0.0915	0.0846
3	0.1249	0.1463	0.0214
4	0.0969	0.1402	0.0433
5	0.0792	0.122	0.0428
6	0.0669	0.0793	0.0124
7	0.058	0.0122	0.0458
8	0.0512	0.0488	0.0024
9	0.0458	0.0122	0.0336
		MAD	0.016775309
		Chi-square	25.5

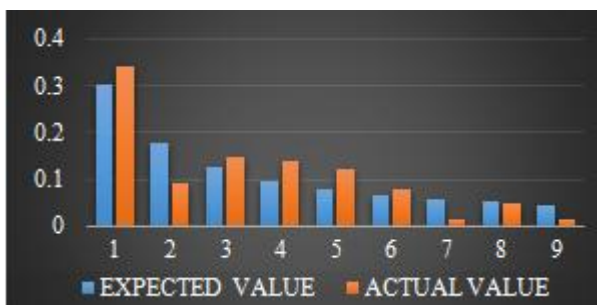


Figure 3: First digit frequency distribution of G V Films Ltd

Analysis

In the above table the theoretical frequencies of the Benford’s law are compared with the observed frequencies for G V Film Ltd. First row shows the Benford’s law frequency distribution. Second row shows the observed frequencies. Result of this analysis shows that fabricated data does not conform to expected theoretical frequencies. Further statistical tool MAD is calculated to check the variation in observed frequencies. The higher the MAD, the larger the average difference between the actual and expected proportions. For the First Digits MAD values above 0.015 signal Nonconformity(Ikbale TOTA,2016). As it can be observed in figure 3 it shows deviation from the Benford distribution. Also from MAD statistical value breaches the cut-off value. The calculated value of the Chi-Square statistic is 25.5 which is greater than the critical value of 15.507 at the 5% level of significance and 8 degrees of freedom. This indicates that the null hypothesis “Observed frequency distribution follow the expected distribution” cannot be accepted.

5. Findings, Suggestion and Conclusion

5.1 Findings

The data analysis revealed that MAD of GRAMEEN FINANCE PVT LTD is 0.020 and null hypothesis is accepted in case of chi-square it means that there is a less likelihood of manipulation in financial statement. The data analysis revealed that MAD of G V FILMS LIMITED is 0.016 and null hypothesis is rejected in case of chi-square it means that there is likelihood of manipulation in financial statement.

5.2 Suggestions

The study concludes with certain potentially relevant recommendations to identify the need of forensic accounting for detection and prevention of white collar crimes. The incidence of white collar crime has maintained an increasing trend since 2002. So it is the high time for corporate sector to adopt an effective fraud detection and prevention mechanism. Forensic audit can provide new opportunities for practising accountants to deal with white collar crime. So forensic audit practice should be encouraged.

5.3 Future Scope of Study

The Benford model so developed in this study could be further tested by using second digit analysis, first two digit analysis and last two digit analysis. And samples for further studies could be enlarged. This could provide further insight into the practice of forensic accounting.

5.4 Conclusion

The detection of fraud in financial statements is a difficult task, which requires more than just using standard auditing procedures. Therefore, auditors need new tools and techniques to simplify auditing tasks and help them in detecting such fraudulent financial statements. As demonstrated above, Benford’s Law can be used as an effective tool to target potential areas of concern in accounting data. The proposed approach should not be used

as the only tool for accounting audit; instead it must be used as a complementary tool.

This study was undertaken with the purpose of checking conformity of the financial data of the selected companies with the Benford's distribution. The results of the analysis indicate that the data as disclosed by Grameen Finance Pvt Ltd shows conformity with Benford's law distribution. The second company, G V Films Ltd, does not show conformity of the Benford's law distribution. This could serve as a red flag for the auditor for further analysis of the financial statement.

The present research was undertaken by applying Benford's law with First Digit analysis. This study could be extended by checking the conformity of the financial statements with the application of Benford's law two digit and three digit test. Further, to ensure that more precise results are derived, more than one model can be applied which would validate the results of the study.

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