



APPLICATION OF BENFORD'S LAW TO DETECT ACCOUNTING FRAUD IN PUNJAB & SIND BANK

Milan Bharatkumar Undavia

Research Scholar, S.D. School of Commerce,
Gujarat University, Ahmedabad.

ABSTRACT

The purpose of this paper is to present a brief overview of the practical applications of Benford's Law. The most well-known and widespread application of Benford's law is in the field of forensic auditing, in particular, in the statistical detection of accounting fraud, where "fraud" means both data fabrication and data falsification. It is widely accepted that authentic data are difficult to fabricate. Thus, standard goodness-of-fit tests, such as a chi-squared test for first and/or second significant digits, or the Ones-scaling test provide simple "red flag" tests for fraud.

Keywords: Benford's Law, BSE, Fraud.

INTRODUCTION

Benford's Law is based on the fact that many numbers normally used in business are not random, but rather follow some ordered progression. For example, a chart showing wealth will show that it is not uniformly distributed; a few people have much wealth and many people have less wealth. Sales, inventory, and disbursements are also not uniformly distributed. Benford's Law uses this fact to help point to fraud, inefficiencies, and other forms of data manipulation. (OVERHOFF, 2011).

DEFINITION OF FRAUD

The term 'fraud' commonly includes activities such as theft, corruption, conspiracy, embezzlement, money laundering, bribery and extortion. The legal definition varies from country to country, and it is only since the introduction of the Fraud Act in 2006, that there has been a legal definition of fraud in England and Wales.

Fraud essentially involves using deception to dishonestly make a personal gain for oneself and/or create a loss for another. Although definitions vary, most are based on these general themes. (Fraud risk management A guide to good practice, 2008)

LITERATURE REVIEW

(Durtschi, Hillison, & Pacini, 2004) identified the types of fraud that auditors can detect by applying Benford's Law to financial statements while also providing guidance on the types of data and statistical tests that auditors should use.

(Nigrini, 2005) Benford's Law was used to identify EPS manipulation in Enron's financial accounts between 2001 and 2002 which resulted in the company's bankruptcy.

(Krakar & Žgela, 2009) studied the Chi-Square test, Z test & MAD are statistically more important and practical to issue conclusions in auditing activities, especially when applied to a large volume of data.

(Cella & Zanolla, 2018) investigated analysis of municipal expenditure with the help of Benford's Law. They used an exploratory research method. The study was based on secondary data & used the Chi-Square test and Z test. The findings of the study revealed that greater difference between Benford's level and municipal expenditure level.

RESEARCH METHODOLOGY

Research Design

The present study entitled “**APPLICATION OF BENFORD'S LAW TO DETECT ACCOUNTING FRAUD IN PUNJAB & SIND BANK**” for the period from 2011-12 to 2020-21.

Objective: To detect the possibility of fraud in the financial statements of Punjab and Sind Bank.

HYPOTHESIS

Null Hypothesis

Ho: There is no significant difference between observed frequency and expected frequency data.

Alternative Hypothesis

H1: There is a significant difference between observed frequency and expected frequency data.

Nature and Sources of data

The present study is mainly based on secondary data. An annual report (Financial Statements - Balance Sheet, Profit & Loss Account & Cash Flow Statement data) has been collected from the Bombay Stock Exchange(BSE) Website.

Period of Study

The present study covers a period of 10 years from the year 2011-12 to 2020-21.

Tools and Techniques

For the purpose of fraud detection of selected Indian companies in the Banking sector, the following mathematical and statistical, tools and techniques are used.

- Chi-Square Test (Statistical Technique)

Chi-Square is a test statistic used to test the hypothesis that provides a set of theoretical frequencies with which observed frequencies are compared. Hence, it is a non-parametric test of statistical significance, which compares observed data with expected data and testing the null hypothesis, which states that there is no significant difference between the expected and observed results. As a test of Goodness of Fit Karl Pearson developed a test for significance called chi-square test of goodness of fit, which is used to test whether or not the observed frequency results support a particular hypothesis. The test can be used to identify whether the deviations, if any, between the observed and estimated values can be because of a chance or some other inadequacies.

- Benford's Law (Mathematical Technique – First Digit & Second Digit)

Benford's Law, also called the First-Digit Law, refers to the frequency distribution of digits in many (but not all) real-life sources of data. In this distribution, the number 1 occurs as the leading digit about 30% of the time, while larger numbers occur in that position less frequently.

(Basu S. , 2014)

Scope of the Study

One Public sector bank **Punjab & Sind Bank** (Highest number of fraud cases and amount) selected from published banking fraud data.

Sr No.	Bank	No. of frauds	Amount (Crore)
1	Punjab & Sind Bank	276	1154.89

(Bank frauds worth 2.05 trillion happened in last 11 years, reveals RBI data , 2019)

ABG SHIPYARD: Fraud in Punjab & Sind Bank

Fraud Amount: Rs.37.00 crore. The Promoter of ABG Shipyards, Rishi Agarwal allegedly fraudulently cheated Rs.37.00 Crore with Punjab & Sind Bank. (ABG Shipyards loan fraud: List of banks affected by India's largest scam, n.d.)

Gitanjali Gems : Fraud in Punjab & Sind Bank

Public sector lender Punjab & Sind Bank has revealed loan exposure of Rs. 44.1 crore to businessman Mehul Choksi. According Punjab and Sind Bank, it had given loans to Choksi's company, Gitanjali Gems, along with its merged entity Gitanjali Exports. As the loan remained unpaid, Punjab & Sind Bank had declared the account a 'non-performing asset' on March 31,2018. (Punjab & Sind Bank reveals Rs 44-crore exposure to Mehul Choksi, 2019)

Table-1

Digit Calculation from Income Statement, Balance Sheet & Cash Flow Statement.**Determining First Digit Test of Benford's Law, Chi-Square Test & Z Test****PUNJAB & SIND BANK**

FIRST DIGIT	Observed Frequency Count (Data)	% of Observed Frequency	Expected Frequency Data (Benford Model)	% of Expected Frequency (Benford Model)	ABS	Chi-Square	Z Test
1	566	28.5138539	597.54455	30.103	1.589146096	1.665245938	1.519046
2	335	16.87657431	349.53865	17.609	0.732425693	0.604718087	0.827252
3	204	10.27707809	248.0059	12.494	2.216921914	7.808359538	2.953237
4	190	9.571788413	192.36635	9.691	0.119211587	0.029109105	0.1416
5	159	8.010075567	157.1723	7.918	0.092075567	0.021253664	0.110363
6	150	7.556675063	132.89575	6.695	0.861675063	2.201389947	1.491115
7	121	6.095717884	115.11015	5.799	0.296717884	0.301366413	0.517597
8	151	7.607052897	101.53275	5.115	2.492052897	24.10068498	4.988889
9	109	5.491183879	90.8336	4.576	0.915183879	3.633216001	1.897562
	1985	100	1985	100		40.36534367 Calculated Value	
					alpha	0.05	
					Table Value	15.50731306	

Source: % of Expected Frequency Benford Model- (Statistical Consultants Ltd, 2011)

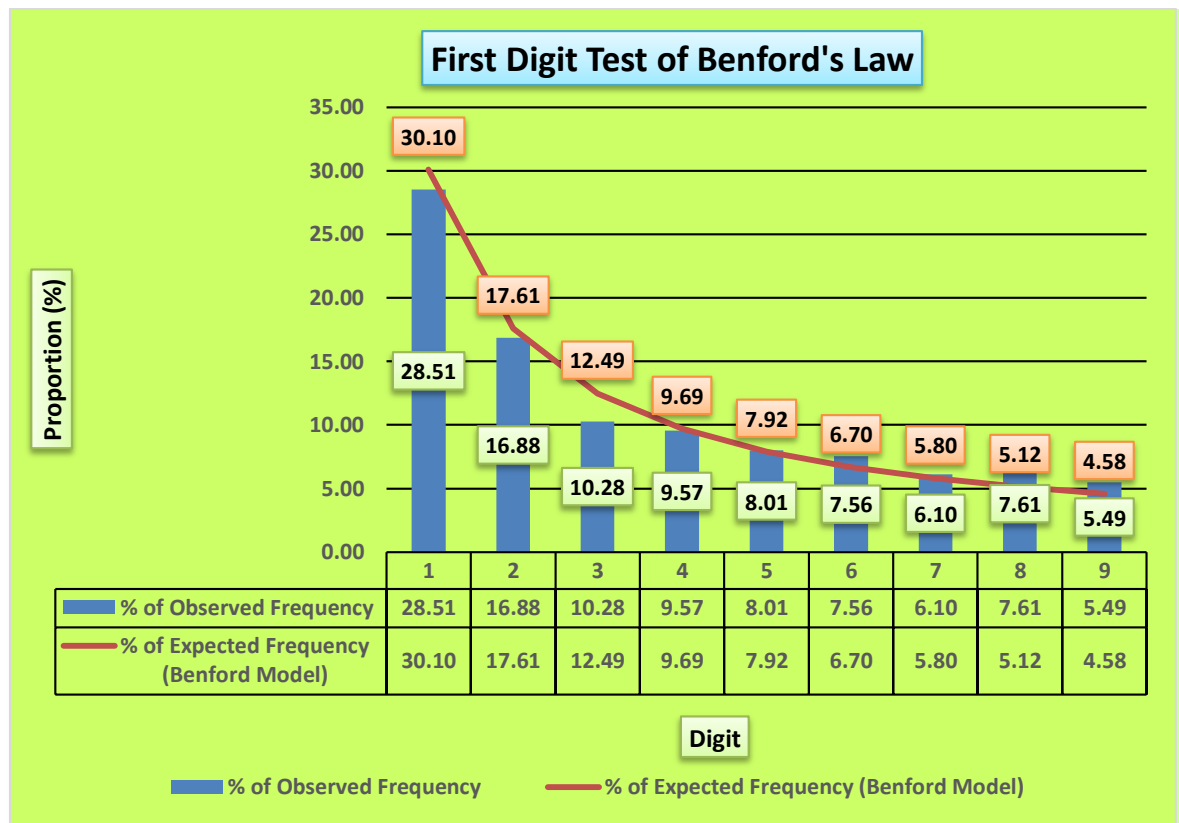


Figure -1 First digit test of Benford’s Law

**PUNJAB & SIND BANK
Interpretation (Chi-Square Test):**

As shown above, the Chi-Square calculated value of 40.36534367 is more than the Chi-Square table value of 15.5073 (40.36534367 >15.5073). So, H0 is rejected because the first digit frequency distribution of observed data does not follow to Expected data. The rejection of H0 shows that the possibility of financial manipulation can not be rejected. It is essential to examine the lending policy of the management of Punjab & Sind Bank. Regular financial checking of borrowers should be done so that Punjab & Sind Bank can change its future results performing to Benford’s analysis.

**PUNJAB & SIND BANK
Interpretation (Z Test):**

In case of Income Statement, Balance Sheet and Cash Flow Statement appears to deviate from Benford’s Law. Here, digits 3 & 8 the value is more than 1.96. So, H0 is rejected and digits 3 & 8 create suspicions in the minds of the stakeholders, overall performance is already suspicious because H0 is rejected. Hence, it is concluded that digits 3 & 8 are important digits from the viewpoint of financial manipulation. It is suggested that all transactions which are part of digits 3 & 8 are to be reexamined by the forensic accountant to check their reliability, True and fair presentation also must be checked, so that in the future if any loss can be presented to concerned stakeholders.

Table-2

Digit Calculation from Income Statement, Balance Sheet & Cash Flow Statement.**Determining Second Digit Test of Benford's Law, Chi-Square Test & Z Test****PUNJAB & SIND BANK**

SECOND DIGIT	Observed Frequency Count (Data)	% of Observed Frequency	Expected Frequency Data (Benford Model)	% of Expected Frequency (Benford Model)	ABS	Chi-Square	Z Test
0	325	16.40585563	237.08608	11.968	4.437855628	32.59937205	6.050723
1	186	9.389197375	225.61609	11.389	1.999802625	6.956217471	2.766474
2	196	9.893992933	215.57242	10.882	0.988007067	1.777034486	1.376026
3	204	10.29782938	206.67773	10.433	0.135170621	0.034692843	0.16006
4	189	9.540636042	198.71411	10.031	0.490363958	0.474872837	0.689116
5	198	9.994952044	191.52308	9.668	0.326952044	0.219036226	0.454408
6	211	10.65118627	184.96597	9.337	1.31418627	3.664299536	1.97178
7	168	8.480565371	178.98335	9.035	0.554434629	0.673995527	0.821593
8	144	7.269056032	173.47617	8.757	1.487943968	5.008437746	2.303145
9	160	8.076728925	168.385	8.5	0.423271075	0.417544467	0.635242
	1981	100	1981	100		51.82550319	Calculated Value
					alpha	0.05	
					Table value	16.9189776	

Source: % of Expected Frequency Benford Model- (Statistical Consultants Ltd, 2011)

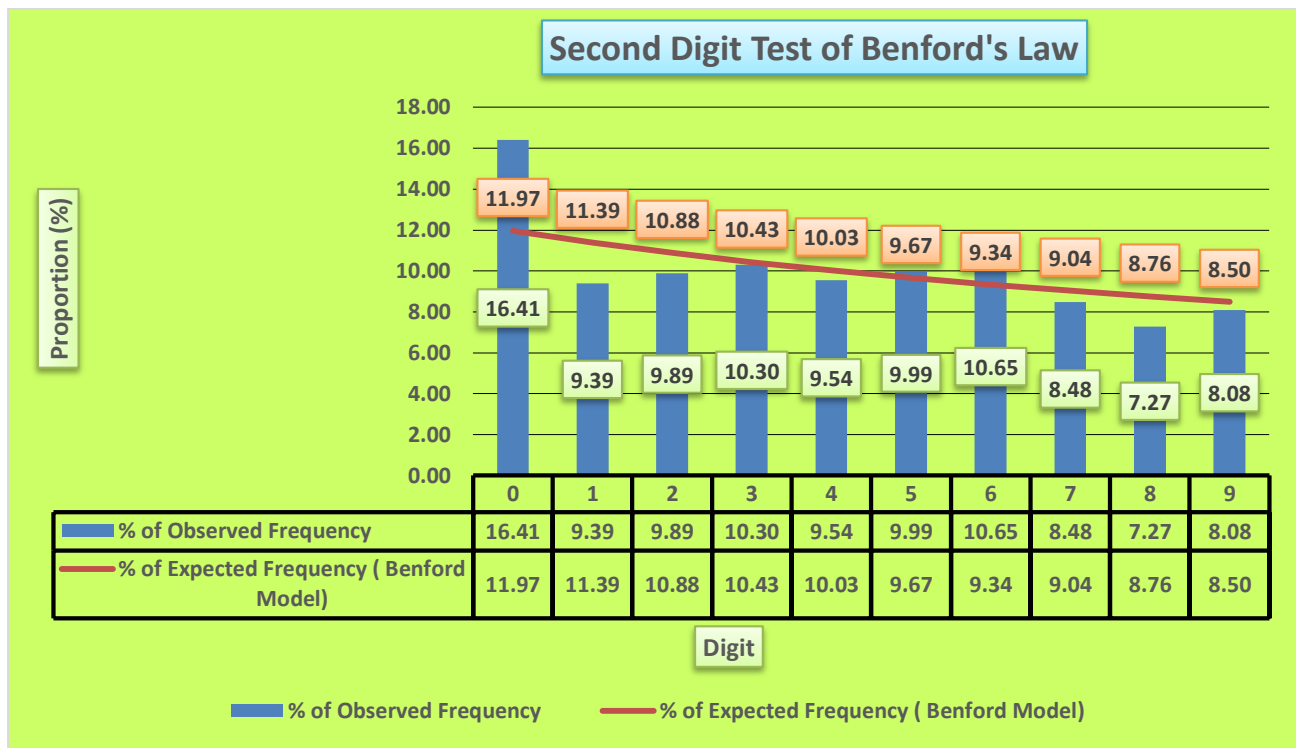


Figure -2 Second Digit test of Benford’s Law.

PUNJAB & SIND BANK

Interpretation (Chi-Square Test):

As shown above, the Chi-Square calculated value of 51.82550319 is more than the Chi-Square table value of 16.9189776 (51.82550319 >16.9189776). So, H0 is rejected because the Second digit frequency distribution of observed data does not follow to Expected data. The rejection of H0 shows that the possibility of financial manipulation can not be rejected. It is essential to examine the lending policy of the management of Punjab & Sind Bank. Regular financial checking of borrowers should be done so that Punjab & Sind Bank can change its future results performing to Benford’s analysis.

PUNJAB & SIND BANK

Interpretation (Z Test):

In case of Income Statement, Balance Sheet and Cash Flow Statement appears to deviate from Benford’s Law. Here, digits 0,1,6 & 8 the value is more than 1.96. So, H0 is rejected and digits 0,1,6 & 8 create suspicions in the minds of the stakeholders, overall performance is already suspicious because H0 is rejected. Hence, it is concluded that digits 0,1,6 & 8 are important digits from the viewpoint of financial manipulation. It is suggested that all transactions which are part of digits 0,1,6 & 8 are to be reexamined by the forensic accountant to check their reliability, True and fair presentation also must be checked, so that in the future if any loss can be presented to concerned stakeholders.

CONCLUSION

The expected frequencies of the digits in tabulated data are provided by Benford's law. It affects the expectations of shareholders and other investors about individual bank valuations and the overall financial conditions in the

sector. To determine a meaningful result, we must predict that the data will follow Benford's law. It is suggested that all transactions which are part of digits 0,1,3,6 & 8 are to be reexamined by the forensic accountant to check their reliability, True and fair presentation also must be checked, so that in the future if any loss can be presented to concerned stakeholders.

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