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Applying Benford's law into Jordanian insurance companies to identify earning's manipulations

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Abstract:

This study is based on Benford's law, which is widely used by researchers to find the indicators of manipulations of revenues and earnings. This study was conducted to ascertain the existence of indicators of manipulations in a 25 insurance companies in Jordan. Both the revenue and net income were taken from the companies' financial statements presented for the period from 2000 to 2015. The studied companies have been divided into two groups. The first group covered the firms that achieved a positive net income (profit) and the second group covered the companies that achieved a negative net income (loss). The earning manipulations existence is evaluated by testing the first digit and the second digit of the observations that are extracted from the financial statements of the listed insurance companies in Amman Stock Exchange.

JEL Classifications: G22,M400,M480

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1. Introduction

Insurance industry is one of the large global industries. According to it is nature of business, it faces a lot of challenges and many types of risks. Therefore, insurance companies should exercise proper risk management to achieve their objectives. The risks of fraud and data manipulations are ones of the most important risks (Al-Rawashdeh & Al Singlawi, 2016).

Like other industries, the insurance industry is facing the problem of earnings manipulation, which is the managerial use of procedures or methods to adjust data on financial reports. Earnings manipulation can mislead stakeholders about the companies' financial performance (Healy & Wahlen, 1999). Management has an incentive to manipulate earnings to reach specific thresholds (Barth, Elliot, & Finn, 1999; Skinner & Sloan, 2002; and Matsumoto, 2002). Any earnings manipulation methods used by companies' management would affect the presentation of financial statements that are considered as the main source of information for all stakeholders to have an understanding of the company's financial performance. Apparently, data adjustment on financial reports will affect the assessment of a company status by users' information. An earnings' manipulation, sometimes called earnings' management, would produce an anomaly in financial data; especially when management has the intention to play with subjective judgments in financial reporting or transaction recognition of

manipulating financial reports occurred. Excessive earnings' manipulations often cause serious fraud in corporate level (Healy & Wahlen, 1999).

Management exercises earnings' manipulation for many reasons: to smooth income, create impression that the company is of low-risk to investors or creditors (Ronen & Sadan, 1981); to meet analysts' earnings expectations in order to keep a steady growth in share price (Payne & Robb, 2000; Jordan & Clark, 2003). Earnings can be manipulated upward and downward (Peek, 2004; Yoon & Miller, 2002). Management manipulates income to avoid reporting losses, decreases in earnings (Burgstahler & Dichev, 1997), to enhance executive bonuses that are tied to income (Healy, 1985; Guidry et al., 1999). To investigate the existence of such earnings' manipulations the applying of the Benford's law is proven to be an effective. There is empirical evidence provided by Rodriguez (2004) that the company earnings should follow Benford's law if there are no earnings manipulations. Durtschi, Hillison, & Pacini (2004) examined the use of Benford's law in the detection of fraud in the management of earnings. The purpose of this research is to determine whether the selected balances in the financial statements of the insurance companies conform to Benford's law.

This research aim to apply Benford's law to insurance companies' revenues and net income disclosed in annual financial reports of the 25 publicly listed companies in Amman Stock Exchange, and the study will answer the two main questions:

1. Is there any manipulation (fraud) practiced by insurance companies through testing the first digit by Benford's law?
2. Is there any manipulation (fraud) practiced by insurance companies through testing the second digit by Benford's law for the revenue and net income in the companies that have achieved losses and profit during that particular year?

2. Literature review

Benford's law states that the frequency of first significant digit in certain samples decreases as those digits increase (Drechsler & Geyer, 2014). This law is used in accounting to find a rounding behavior. Several studies provided evidence that firms may round up earnings when they are just below reference points denoted by $N \times 10k$. Lin Fengyi & Wu Sheng-Fu (2015) have applied Benford's law to examine the earnings of companies publicly listed in Taiwan in the period between 1993 and 2011. They found that regardless of whether the company is profitable, the phenomenon of earnings management may be evident. Another interesting finding is that the rounding-of-earnings phenomenon remains popular among Taiwan's publicly listed companies, although the degree of earnings manipulation has declined with the gradual implementation of corporate governance mechanisms. Jorgensen et al. (2014) used annual data and examined a longer time period (i.e., 1980-2010). Earnings Per Share (EPS) were computed and presented under the rules of Accounting Principles Board Opinion (APBO) No. 15 prior to December 1997 and under the rules of Statement of Financial Accounting Standards (SFAS) No. 128 subsequent to November 1997. For the APBO No. 15's period, the third decimal digit in calculated EPS occurred in the five through nine range 53.29% of the time, which was significantly higher than the expected rate of 50%. For the SFAS No. 128's period, the third decimal digit appeared in the five through nine range 51.11% of the time. Although it was lower than what occurred in the APBO No. 15's phase, it was still significantly greater than the expected frequency of 50%. You (2014) focused on calculating "abnormal" segment earnings by comparing the earnings reported by multi-segment firm and the ones reported by single-line-of-business firm operating in the same industry. This was based on the assumption that pre-managed earnings reported by a segment within a multi-segment firm should be comparable to that reported by a single-line-of-business firm. Their conclusions will be challenged if this assumption is invalid.

ÖzerGökhan & Babacan Burak (2013) studied the effectiveness of Benford's law through a digital analysis of the off-balance sheet account disclosures made by Turkish banks during the 1990-2010. They found that off-balance sheet account disclosures in the fiscal 1999 don't comply with Benford's law. Our finding is consistent with the Turkish banks' practices. They also provide evidence on "the law of anomalous numbers". Our results indicate a link between economic policy and deviation from frequencies of Benford's law. Miller et al.'s (2012) primary contribution to the literature in this area was their discovery that the propensity to manipulate earnings to provide an additional cent of EPS through rounding the third decimal digit rose dramatically while the smaller the absolute size of EPS. For example, as noted above, for their full sample of firm-quarters, the third decimal digit occurred in the five through nine range 53% of the time. However, when the sample was pared down to include only firm-quarters with EPS of \$.20 or less, the portion in the five through nine ranges increased to 54.5%. For firm-quarters with EPS of \$.05 or less, the frequency in the five through nine range rose to 57.5%.

Hann & Lu (2009) based their study on the distribution of reported earnings, which is a relatively direct method. However, their method focusses on reported earnings around zero and, therefore, does not state to earnings management in profitable segments. Thus, there is a need for new methodology to directly capture earnings management in profitable segments. Guan et al. (2008) test earnings numbers of US firms over a period of more than 50 years. In particular, they test rounding of earnings numbers across different industries and report that energy companies tend to engage in this activity more often than other industries, while utilities tend to do it less often.

Davis (2002) examines the market's response to revenue and revenue announcements of Internet firms which majority of them are loss firms; he finds that revenue announcements are highly associated with market returns. Therefore, managers of loss firms may engage in rounding more often on reporting revenues than on the negative earnings. Cleary & Thibodeau (2005) argue that the application of digital analysis using Benford's law holds great promise as a fraud detection process. However, a closer look at the underlying statistical assumptions reveals that auditors seeking to use Benford's law must be aware of the costs of the potential Type I errors that can occur during the analysis stage. For example, statistical considerations indicate that there is a far greater chance of making a Type I error if the Benford's law analysis is completed on a "digit-by-digit" basis, as compared to the "test-by-test" basis typically employed by statisticians.

Skousen, Guan, & Wetzel (2004) replicate the earlier studies for Japanese firms. Their sample consisted of 1,871 Japanese companies and 37,900 annual earnings observation from 1974 to 1997. Similar to previous studies, the authors find that the first digit of earnings is often emphasized by management. They note that rounding behavior is not limited to the first digit. The second, third and even fourth digits are sometimes used as the reference points of the rounding earnings behavior. Kinnunen & Koskela (2003) introduced an international comparative dimension. Using a sample of approximately 87,000 earnings observations from almost 22,000 firms in 18 countries, the authors found that upward rounding is much more significant on the bottom line than on the top of an income statement. Another interesting finding is that the rounding behavior is influenced by some institutional factors like spending on auditing or the importance of management bonus schemes.

Thomas (1989) demonstrates that U.S. firms with positive earnings manipulate income by rounding up the earnings' second digit to increase the earnings' first digit by one, thereby reaching cognitive reference points in income. Companies with negative income manipulate earnings in the opposite direction. The current study replicates Thomas' (1989) twenty-year old research to ascertain if this type of earnings management continues today, particularly in light of the heightened scrutiny managers now face to present fair financial reporting. The results suggest that managers of negative earning firms no longer engage in this manipulative behavior while managers of positive earning firms continue to do so. In addition, for positive earnings firms, the findings indicate that the propensity to engage in

this form of earnings management is related to specific company characteristics. Small firms appear to manage earnings to achieve cognitive reference points more intensively than large firms. Likewise, low-leverage companies exhibit this manipulative behavior more frequently than high-leverage firms, and less profitable firms engage in this activity more aggressively than companies enjoying high profit margins.

Carslaw (1988), Thomas (1989), and Caneghem (2002; 2004) study the earnings numbers of companies' in New Zealand, USA, and U.K respectively. They found that companies' managers adjust earnings numbers to the closest cognitive reference point of $N \times 10k$. For example, from \$19,998 to \$20,000, or from \$999,999 to \$1,000,000. Their findings indicate that the frequency of 0 as the second digit in positive earnings figures is higher than expected and that of 9 as the second digit is lower than expected, showing that managers emphasize the first digit of earnings numbers and tend to round earnings numbers up by increasing the first digit by one.

3. Benford's law. Theoretical framework

Benford's law is sometimes called the "first digit phenomenon". It was discovered in 1881 by the American mathematician Knuth (1969); it was stated that the "first digit phenomenon" of Benford's distribution is a "second generation" of distribution or could be a combination of other distributions.

Benford (1938) noted that, in case of natural occurrence of numbers between 0-9, the first position in a number possesses has a large bias for low digits. For example, naturally number one appears in the first position about 31.1% of the time, while number two is appearing in the first position for about 17.6% of the time. Number three is appearing in the first position about 12.49% of the time. Number four is also expected to appear in the first position for about 9.69% of the time and respectively up to number 9, which is expected to appear in the first position for about 4.58% of the time.

Benford computed the expected frequencies of the digits in various positions within a number. For examples, when number one is appearing as first digit for about 31.1% of the time, it expected to be in second digit position about 11.39% of the time. He also tests the expected frequencies against 20 widely diverging lists of numbers with a total of 20, 229 observations of listed numbers that are related to the following: geographic areas of rivers; a list of all the numbers in an issue of Reader's Digest; and the first 342 street addresses given in the American Men of Science. Benford found that his expected digital frequencies accurately reflect the observed digital frequencies for numbers that are in unknown relationships. Nigrini (1999) confirmed that Benford's expected digital frequencies are suitable to identify manipulations in financial statement. Financial data represents a combination of numbers from different sources making these numbers very suitable for the application of the Benford's distribution as a test for errors or fraud (Hill, 1995). Nigrini (1996) also applied Benford's law to account data for the fraud detection (Nigrini, 1996). Based on of Benford's law, he suggests that there are two primary error risks: (1) False Positives - Benford shows nonconformance when the data conforms (Type I or efficiency error); (2) False Negatives - Benford shows conformance when the data does not conform (Type II or effectiveness error). According to Durtschi et al. (2004), Benford's law is most effective in conditions including the following:

- Large data set (thousands).
- Data represents more than one distribution.
- Transactional data.
- Mean is greater than median and skewness is positive.

Previous research in the private sector has used financial statement summary totals (e.g., net income, revenues and earnings per share) (Johnson, 2005; Nigrini, 2005; Thomas, 1989; Carslaw, 1988). If the balances are in conformance with Benford's law, then it can

be assumed that these balances truly represent the transactions. If the balances do not conform to Benford's law, this signals that these data may not be truly represented; the numbers may be influenced by operations biased due to error, or they may have been manipulated to deceive a financial statement user. While nonconformance does not guarantee that problems exist in the underlying accounts comprising the balance or that fraud has occurred, results of the Benford analysis should be used as an indicator that further investigation is needed.

The following table provides Benford's expected digital frequencies for the first two positions within a number:

Position of digit number		
Digit	First	Second
0		11.97%
1	30.10%	11.39%
2	17.61%	10.88%
3	12.49%	10.43%
4	9.69%	10.03%
5	7.92%	9.67%
6	6.70%	9.34%
7	5.80%	9.04%
8	5.12%	8.76%
9	4.58%	8.50%

4. Research methodology

4.1 Data and research method

This study is based on Benford's law, which is widely used by researchers to find the indicators of manipulations of revenues and earnings. This study was conducted to ascertain the existence of indicators of manipulations in a 25 insurance companies in Jordan. Both the revenue and net income were taken from the companies' financial statements presented for the period from 2000 to 2015. However, two conditions have to be met in order to apply this law on financial statements that: (i) The mean value must be greater than the median of the observations; and (ii) The skewness must be a positive value (Özari & Ocak, 2013).

The studied companies have been divided into two groups. The first group covered the firms that achieved a positive net income (profit) and the second group covered the companies that achieved a negative net income (loss). Previous studies have shown that the nature of the targeted result by fraudulent companies decides to which direction the fraud has been done. Companies that have achieved positive results are rounding-up; for example, a company achieved a net income of 2.9 million JOD manipulates the figure and round it up to report 3 million JOD. While, companies that achieved loss might try to rounding-down the figures; for example, a company achieved a loss of 3 million JOD is seeking to bring them closer to the bottom to create more negative impact by disclosing to 2.9 million JOD.

The earning manipulations existence is evaluated by testing the first digit and the second digit of the observations that are extracted from the financial statements of the listed insurance companies in Amman Stock Exchange. At the beginning, the numbers from the first digit will be tested using the Chi-square test. This test shows whether the frequency of the financial numbers of the accounts to be tested or not by Benford's law. When the observations frequency is not compatible to Benford's law, there is an indication for earning management manipulation. If the value of Chi-square calculated is

larger than the spreadsheet, it indicates that the financial data may be manipulated by these companies. The value of Chi-square is computed according to the following equation:

First Chi-squared equation used for first digit of the numbers from (1 - 9):

$$X^2 = \sum_{i=1}^9 \frac{[nP_o - nP_e]^2}{nP_o} \quad (1)$$

Johnson, & Weggenmann (2013) indicated that test result may give a wrong indication even with the value of Chi-square is greater than tabulated value: that manipulation is exist, while in reality it is not. This fault indication is an error called (type 1 efficiency error); and to avoid making such mistake the Mean Absolute Deviation Test (MAD) is used to increase confidence in the result.

Mean Absolute Deviation (M.A.D) calculated in the following equation:

$$M.A.D = \frac{1}{N} \sum_{i=1}^N f_i |x_i - \bar{X}| \quad (2)$$

Where N is the sample size; x_i is the sample value; $\bar{X}$ is expected value, f is the frequency.

In particular, the study will also look more closely at the figures that were not replicated by the Benford's law using the Z-score test for the number (1 to 9), which will be calculated according to the following equation:

Z-value is calculated in the following equation:

$$Z = \frac{|P - P_o| - (1/2n)}{\sqrt{P_o(1 - P_o)/n}} \quad (3)$$

Where P is observed proportions; P_o is expected proportions, and sample size is represented by n ; $(1/2n)$ applied only when it is smaller than absolute value of $P - P_o$. The second hypothesis analysis of fraud (manipulations through the rounding up or down of the insurance companies in Jordan) will examine the numbers that fall within the second digit of tested numbers for both revenue and net income. Therefore, this study will provide evidence of fraud by companies; the rounding-up process means that companies are bringing the results closer to a higher number. For example, when a company achieves a profit of 29000 JOD, the second digit will be rounded up to 30,000. This means that there is a large frequency of 0 and a small frequency of the number 9. The rounding-down process is on the contrary, i.e. the companies are trying to reduce their negative result. Therefore, the number 9 frequency is greater than Benford's Law Applications and the number 0 is also less. In order to test these two phenomena, this study will first test the compatibility of the digit numbers frequency of the second digit

with Benford's law for all the numbers observed from (0 to 9) using the Chi-square equation for testing second digit of the numbers from (0 - 9) (Equation 1). Z-value is calculated according to the Equation 3. When the significance is less than 5%, at the 95% confidence level, this means that the number does not correspond to the Benford's law frequency. If the value is greater, this indicates that it is consistent with the replication of the Benford's law.

4.2 Research hypotheses

The first main hypotheses

The actual frequency of the first digit of the revenue and profit follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan during the year.

Hypothesis H1-1:

The actual frequency of the first digit of the revenue follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan that have achieved profits during the year.

Hypothesis H1-2:

The actual frequency of the first digit for the net income follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan which have achieved profits during the year.

Hypothesis H1-3:

The actual repetition of the first digit of the revenue follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan which have achieved losses during the year.

Hypothesis H1-4:

The actual frequency of the first digit for the net income follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan that have achieved losses during the year.

The second main hypotheses

The numbers 0 and 9 within the second digit of the revenue and net income for companies that have achieved losses or profits during the year: the frequency of the number 0 is greater than the expected frequency; and the number 9's frequency is less than expected according to Benford's law; and both (indicators for both rounding-up and rounding-down for second digit) are statistically significant.

Hypothesis H2-1:

The numbers 0 and 9 within the second digit of the revenue for companies that have achieved profits during the year: the frequency of the number 0 is greater than the expected frequency; and the number 9's frequency is less than expected according to Benford's law; and both are statistically significant.

Hypothesis H2-2:

The numbers 0 and 9 within the second digit of the net income for companies that have achieved profits during the year: the frequency of the number 0 is greater than the expected frequency; and the number 9's frequency is less than expected according to Benford's law; and both are statistically significant.

Hypothesis H2-3:

The numbers 0 and 9 within the second digit of the revenue for companies that have achieved losses during the year: the frequency of the number 0 is greater than the expected frequency; and the number 9's frequency is less than expected according to Benford's law; and both are statistically significant.

Hypothesis H2-4:

The numbers 0 and 9 within the second digit of the net income for companies that have achieved losses during the year: the frequency of the number 0 is greater than the expected frequency; and the number 9's frequency is less than expected according to Benford's law; and both are statistically significant.

5. Descriptive analysis

Result analysis:

TABLE 1. DESCRIPTIVE STATISTIC FOR NET INCOME AND SALES

COMPANIES	STATISTIC	REVENUE	NET INCOME
Companies reported positive net income	Mean	8719564.536	1235166.838
	Median	5941462	736822
	Skewness	2.267651266	5.861127514
	Minimum	35300	7422
	Maximum	59743344	19021695
	Number of observation	235	235
Companies reported negative net income (absolute)	Mean	7539455.621	1424105.015
	Median	7476252	738820.5
	Skewness	0.057031224	1.420841533
	Minimum	40496	43664
	Maximum	17927153	5706613
	Number of observation	66	66

To use Benford's law, two conditions have to be met to apply it on financial statements data. First, the mean value must be greater than the median of the observations. Second, the skewness must be in a positive value (Özari & Ocak, 2013). As shown in the Table 1, both conditions were applied.

5.1 Testing first digit

Tables 2-5 demonstrate testing first digit of companies reported positive and negative net income for both revenue and net income.

From Table 2, the value of Chi-square (33.1) is greater than the tabulated value. This means that the number of digits (1 to 9) is not consistent with the Benford's law. This indicates that there may be indications of manipulations existence in the revenue of the companies, and in order to avoid the error of judgment, the MAD test was done to confirm the obtained result. The MAD value also indicates the nonconformity; therefore, the final result is the possibility of manipulations existence in the company's revenue fraud in this account. The Z-value is used to identify the figures that were not compatible with Benford's law. The result shows that the first digit has much deviation, and the second digit has a deviation that is less than expected and statistically significant.

**TABLE 2. DISTRIBUTION OF FIRST DIGIT OF REVENUE
IN COMPANIES REPORTED POSITIVE NET INCOME**

Number	1	2	3	4	5	6	7	8	9
Observed proportion (%)	45.957	12.340	8.085	7.660	5.957	3.830	5.532	4.681	5.957
Expected proportion (%)	30.103	17.609	12.494	9.691	7.918	6.695	5.799	5.115	4.576
Deviation rate (%)	15.854	-5.269	-4.409	-2.031	-1.961	-2.865	-0.267	-0.434	1.381
Z-statistics	5.2273	2.0347	1.9454	0.9424	0.9922	1.6268	0.0356	0.15404	0.8573
P-value	0.000*	0.0418*	0.0517	0.3459	0.3211	0.1037	0.9716	0.8776	0.3912

Note: Number of observation (N) = 235. Chi-square calculated to all of digit 33.10198, where Chi-square tabulated 15.507 at 8 degree of freedom. Mean absolute deviation (M.A.D) is 0.0383 (Nonconformity). * - Significance at 5% (two-tailed test).

This indicates that there were manipulations with revenue data in the insurance companies that achieved position net income based on testing the first and second digit. Therefore, H1-1 is rejected because the actual frequency of the first digit of the revenue does not follow the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan that have achieved profits during the year.

**TABLE 3. DISTRIBUTION OF FIRST DIGIT FOR NET INCOME
IN COMPANIES REPORTED POSITIVE NET INCOME**

Number	1	2	3	4	5	6	7	8	9
Observed proportion (%)	31.489	14.043	10.638	11.064	6.809	7.234	6.383	5.106	7.234
Expected proportion (%)	30.103	17.609	12.494	9.691	7.918	6.695	5.799	5.115	4.576
Deviation rate (%)	1.386	-3.566	-1.856	1.373	-1.109	0.539	0.584	-0.009	2.658
Z-statistics	0.3922	1.3497	0.7617	0.6011	0.5090	0.2001	0.2434	0.0059	1.7938
P-value	0.6949	0.1771	0.4462	0.5477	0.6107	0.8414	0.8076	0.9952	0.0728

Note: Number of observation (N) = 235. CHI square calculated to all of digit 7.18614, where Chi-square tabulated 15.507 at 8 degree of freedom. * - Significance at 5% (two-tailed test).

In Table 3, the Chi-square result is less than the scale of 7.18. This means that there is no evidence of manipulations in the net income in the profitable companies. Also, the Z-value test does not show the figures which are not compatible with the Benford's law. The result is that the insurance companies that achieved positive net income do not manipulate with the net income data. Therefore, H1-2 is accepted because the actual frequency of the first digit of the net income follows the expected frequency by Benford's law and is statistically significant for the insurance companies in Jordan that have achieved profits during the year.

**TABLE 4. DISTRIBUTION OF FIRST DIGIT FOR REVENUE
IN COMPANIES REPORTED NEGATIVE NET INCOME**

Number	1	2	3	4	5	6	7	8	9
Observed proportion (%)	36.364	1.515	9.091	6.061	9.091	6.061	15.152	4.545	12.121
Expected proportion (%)	30.103	17.609	12.494	9.691	7.918	6.695	5.799	5.115	4.576
Deviation rate (%)	6.261	-16.094	-3.403	-3.630	1.173	-0.634	9.353	-0.570	7.545
Z-statistics	0.9746	3.271	0.6499	0.7889	0.1249	0.2062	2.9875	0.2100	2.6388
P-value	0.3297	0.001*	0.5157	0.4301	0.9006	0.8366	0.0028*	0.8336	0.0083*

Note: Number of observation (N) = 66. CHI square calculated to all of digit 30.43915, where Chi-square tabulated 15.507 at 8 degree of freedom. Mean absolute deviation (M.A.D) is 0.054069 (Nonconformity). * - Significance at 5% (two-tailed test).

Table 4 shows the value of Chi-square as 30.43, which is greater than the tabulated value. This indicates the possibility of manipulation in the revenue of the companies that have achieved loss in the observed period. This is also confirmed by the MAD test, which also shows the nonconformity with Benford's law. The numbers that are not consistent and statistically significant are 2, 7 and 9. The number 2 decreases significantly more than expected by a difference of 16%. The number 7 shows the greater recurrence than expected according to Benford's law - the difference reached 9%. The number 9 also resulted in a 7.5% higher than expected rate of recurrence. Therefore, H1-3 is rejected because there is evidence of manipulation in the revenue of the companies who achieved loss.

TABLE 5. DISTRIBUTION OF FIRST DIGIT FOR NET INCOME
IN COMPANIES REPORTED NEGATIVE NET INCOME

Number	1	2	3	4	5	6	7	8	9
Observed proportion (%)	25.758	21.212	12.121	12.121	13.636	4.545	4.545	0.000	6.061
Expected proportion (%)	30.103	17.609	12.494	9.691	7.918	6.695	5.799	5.115	4.576
Deviation rate (%)	-4.345	3.603	-0.373	2.430	5.718	-2.150	-1.254	-5.115	1.485
Z-statistics	0.6354	0.6069	0.0915	0.4593	1.4925	0.4524	0.1723	1.6068	0.2826
P-value	0.5251	0.5439	0.9270	0.6460	0.1355	0.6509	0.8632	0.1080	0.7774

Note: Number of observation (N) = 66. CHI square calculated to all of digit 8.36394, where Chi-square tabulated 15.507 at 8 degree of freedom. * - Significance at 5% (two-tailed test).

From Table 5, the Chi-square score of 8.36 is less than the tabulated value. This means that there is no evidence of manipulations in the net income of the companies that have suffered losses during the year. Also, for the Z-value test, there is no number (figures 1 through 9) showing incompatibility with Benford's law. Therefore H1-4 is accepted because there is evidence that the first digit of net income is confirmed with Benford's law frequencies.

5.2 Testing second digit

Tables 6-9 demonstrate testing second digit of companies reported positive and negative net income for both indicators (revenue and net income).

TABLE 6. DISTRIBUTION OF SECOND DIGIT FOR REVENUES
IN COMPANIES REPORTED POSITIVE NET

Number	0	1	2	3	4	5	6	7	8	9
Observed proportion (%)	11.915	15.319	10.638	10.638	10.213	11.489	8.936	8.511	5.957	6.383
Expected Proportion (%)	11.968	11.389	10.882	10.433	10.031	9.668	9.337	9.035	8.757	8.500
Deviation rate (%)	-0.053	3.930	-0.244	0.205	0.182	1.821	-0.401	-0.524	-2.80	-2.117
Z-statistics	0.0250	1.7938	0.0152	0.1029	0.0927	0.8344	0.0990	0.1666	1.4028	1.0467
P-value	0.9800	0.0728	0.9878	0.9180	0.9261	0.4040	0.9211	0.8676	0.1606	0.2952

Note: Number of observation (N) = 235. CHI square calculated to all of digit 7.47837, where Chi-square tabulated 16.919 at 9 degree of freedom. * - Significance at 5% (two-tailed test).

Table 6 shows that the number 0 is the less than expected. The actual and expected repetitions are convergent and the difference is not statistically significant. As for the number 9, the actual frequency is less than the expected frequency, since the difference

between them is -2.11. However, this difference is not statistically significant. Results demonstrate that the companies making profit do not process the rounding-up of the revenue; therefore, H2-1 is accepted.

TABLE 7. DISTRIBUTION OF SECOND DIGIT FOR NET INCOME
IN COMPANIES REPORTED POSITIVE NET

Number	0	1	2	3	4	5	6	7	8	9
Observed proportion (%)	13.617	9.362	12.340	11.489	13.617	11.064	11.489	6.809	5.106	5.106
Expected proportion (%)	11.968	11.389	10.882	10.433	10.031	9.668	9.337	9.035	8.757	8.500
Deviation rate (%)	1.649	-2.027	1.458	1.056	3.586	1.396	2.152	-2.226	-3.651	-3.394
Z-statistics	0.6783	0.8756	0.6131	0.5297	1.8299	0.6136	1.0219	1.0767	1.8644	1.7484
P-value	0.4975	0.3812	0.5398	0.5963	0.0672	0.5394	0.3068	0.2816	0.0622	0.0803

Note: Number of observation (N) = 235. CHI square calculated to all of digit 14.4946, where Chi-square tabulated 16.919 at 9 degree of freedom. * - Significance at 5% (two-tailed test).

In Table7 the number 0 shows a greater frequency than expected by 1.6%, but it is not statistically significant. The number 9 also shows a decrease from the expected frequency of -3.4, but also not statistically significant. Therefore, the Hypothesis H2-2 is accepted because the test shows that insurance companies listed on the Amman Stock Exchange do not round-up the positive net income account.

TABLE 8. DISTRIBUTION OF SECOND DIGIT FOR REVENUES
IN COMPANIES REPORTED NEGATIVE NET

Number	0	1	2	3	4	5	6	7	8	9
Observed proportion (%)	22.727	12.121	9.091	9.091	4.545	15.152	7.576	6.061	4.545	9.091
Expected proportion (%)	11.968	11.389	10.882	10.433	10.031	9.668	9.337	9.035	8.757	8.500
Deviation rate (%)	10.759	0.732	-1.791	-1.342	-5.486	5.484	-1.761	-2.974	-4.212	0.591
Z-statistics	2.5033	0.1872	0.2696	0.3566	1.4834	1.2991	0.2802	0.6282	0.9926	0.1721
P-value	0.0123*	0.8515	0.7874	0.7213	0.1379	0.1939	0.7793	0.5298	0.3209	0.8633

Note: Number of observation (N) = 66. CHI square calculated to all of digit 12.9855, where Chi-square tabulated 16.919 at 9 degree of freedom. * - Significance at 5% (two-tailed test).

TABLE 9. DISTRIBUTION OF SECOND DIGIT FOR NET INCOME
IN COMPANIES REPORTED NEGATIVE NET

Number	0	1	2	3	4	5	6	7	8	9
Observed proportion (%)	7.576	12.121	10.606	7.576	16.667	4.545	16.667	4.545	13.636	6.061
Expected proportion (%)	11.968	11.389	10.882	10.433	10.031	9.668	9.337	9.035	8.757	8.500
Deviation rate (%)	-4.392	0.732	-0.276	-2.857	6.636	-5.123	7.330	-4.490	4.879	-2.439
Z-statistics	0.9097	0.1872	0.0719	0.7593	1.7944	1.1999	1.8350	1.0575	1.1846	0.4899
P-value	0.3629	0.8515	0.9426	0.4476	0.0727	0.2301	0.0665	0.2902	0.2361	0.6242

Note: Number of observation (N) = 66. CHI square calculated to all of digit 13.83088, where Chi-square tabulated 16.919 at 9 degree of freedom. * - Significance at 5% (two-tailed test).

Testing hypothesis (H2-3) (Table 8) assumes that the companies resulting in a loss is rounding-down. The number 0 shows the frequency which is statistical significant and higher than expected by 10.75%. The number 9 is actually more than the expected by 0.6% and is not statistically significant. This result means that the insurance companies do not round-down the revenue.

The results presented in Table 9 test the H2-4 Hypothesis that insurance companies resulting in loss were rounding-down net income data. Table 9 shows that the number 0 recurrence is less than the expected frequency according to Benford's law, but it is not statistically significant; and the number 9 also shows a decrease in the value of the expected frequency with a deviation of up to 2.43. Also, this deviation is not statistically significant. Therefore, this result confirms that the insurance companies achieved losses are not rounding-down to calculate net income. Therefore, the H2-4 is accepted.

6. Conclusions

Testing the first listed insurance companies in the Amman Stock Exchange for revenue and net income according to Benford's law indicates the following:

Testing first digit:

- a. Insurance companies reported positive net income of (revenue and net income)
 1. There are an indications of manipulations (fraud) existence in revenue.
 2. There may be no indications of manipulations (fraud) existence in net income.
- b. Insurance companies reported negative net income of (revenue and net income)
 1. This indicates the possibility of manipulation with the revenue in the companies that have loss
 2. No evidence of manipulations with the net income in the companies that have suffered losses during the year

Testing second digit:

- a. Insurance companies reported positive net income of (revenue and net income)
 1. Companies that make a profit do not process the rounding-up of the revenue
 2. Companies that make a profit do not process the rounding-up of the net income
- b. Insurance companies reported negative net income of (revenue and net income)
 1. companies that make losses do not round-down the revenue.
 2. companies that make losses do not round-down the net income

There are many types of fraud and manipulation in the company's management. Such behaviors affect decision making ability of financial statement users, and mislead investors. Jordan Insurance Federation should strictly come up with new rules and regulations to stop the insurance companies of all types to involve in fraud and manipulation. Also, the auditor should play the greater role in reducing the earnings manipulative behavior.

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